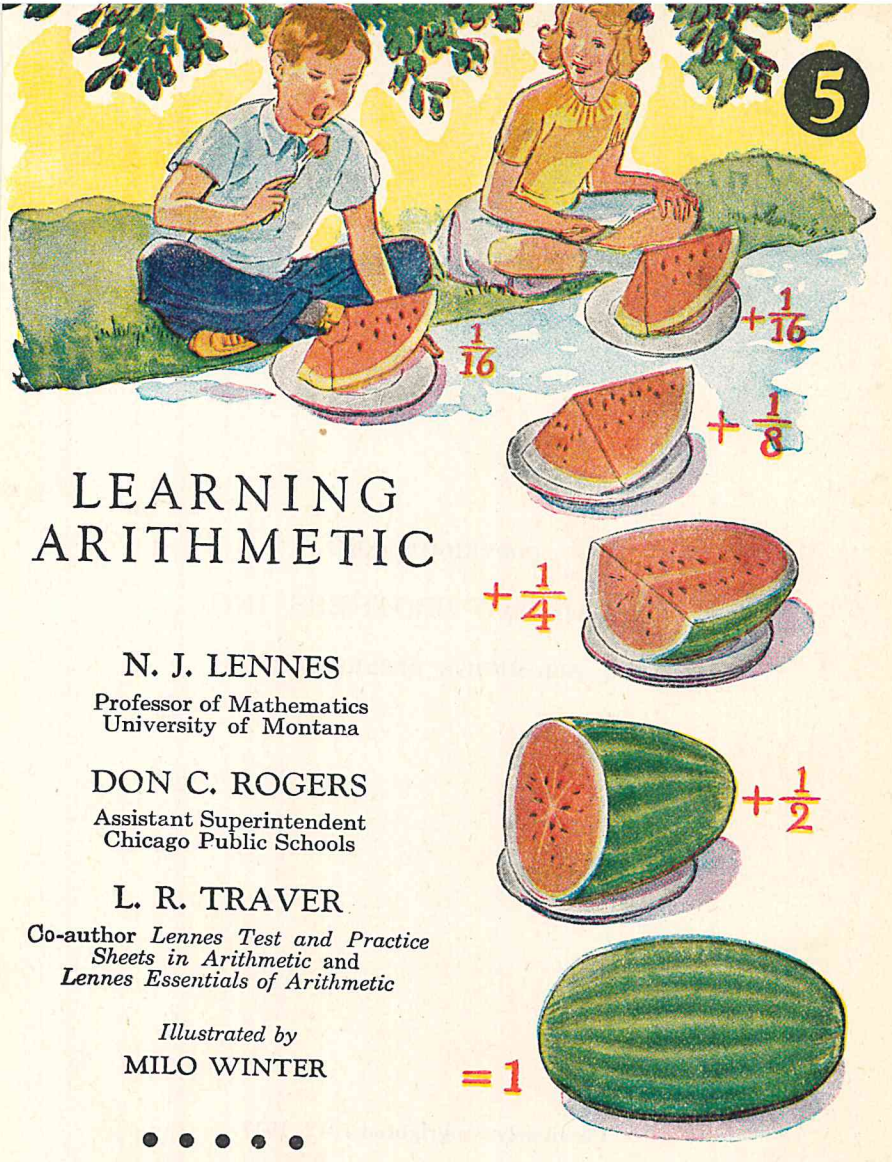

LEARNING ARITHMETIC

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TEACHER'S FOREWORD

Basic Aims. The *Learning Arithmetic* series is based upon the thought that pupils must understand what it is they are expected to learn. It follows that what they are taught must be meaningful to them. On the basis of this fundamental concept, pupils are taught in this series to use with understanding quantitative measures, to become skillful in the use of the fundamental operations, and to acquire increasing ability to solve problems through the use of these fundamental operations. Pupils are helped to achieve these basic aims in this series through scientifically planned methods of presentation.

Organization. The organization of this book is such that teachers may teach arithmetic effectively through it and pupils may learn arithmetic effectively from it. All the topics are grouped into units. Each unit contains sufficient work for two weeks. This arrangement makes it easy for teachers to plan their work.

Each group of four units is followed by a cumulative self-test. These tests give each pupil a profile of his achievement in all phases of the arithmetic he has studied. In so doing, they offer opportunities for each pupil to realize satisfaction in achievement. At the same time they help make each pupil aware of weaknesses which must be overcome if he is to enjoy the full satisfaction that accompanies perfect performance. The results of these tests may be used by teachers as indices to determine wherein re-teaching should be done, and to indicate the phases of the program that should receive added attention in future presentations.

The topics are placed and developed in each book of the series in conformity with a study of curricular needs and courses of study. The rate of development of each topic is determined by the complexity of the topic. The use of this rate guide helps assure that pupils will find no insurmountable obstacles in their arithmetic study.

The achievement of mere speed in computation is not stressed as something apart from the standard learning process in arithmetic, but as an integral part of each presentation. Accuracy in computation is stressed throughout, along with methods of achieving desirable speed.

It is important that pupils be helped to look upon arithmetic as a complete subject. In this series—as a part of bringing about this completeness—the fundamental opera-

tions are developed in close relationship to problems. The problems themselves are based upon experiences that every pupil could reasonably have had and enjoyed. Thus the problems are presented as natural problems that grew out of situations with which nearly everyone is familiar. Thus the *Learning Arithmetic* series presents arithmetic as a skill that pupils need and use in their daily living, now as well as in the future.

The ability to solve problems is developed through the use of a comparatively small number of basic problem types, scientifically determined and classified. This assures that pupils may learn arithmetic in its entirety and as a complete subject, because these type-problems reflect the arithmetical needs of nearly every social area.

The same kind and degree of care was spent in developing the exercises in fundamental operations as was spent in providing problem-solving experience. Both exercises and problems are scientifically constructed and distributed so as to assure adequate practice for the development and maintenance of skill in all basic number facts, the fundamental operations, and practical type-problems.

In grade 7 and grade 8 of this series there is a section called "Practical Applications of Arithmetic." In grade 7, the 63 pages devoted to this subject are called and are concerned with "The Arithmetic of the Home and Personal Needs." In grade 8, the 63 pages are called and are concerned with "The Arithmetic of Business and Earning a Living."

Control of Difficulty. Throughout the series the use of social situations common to the experience of a majority of pupils helps insure pupil understanding. In addition to control through the use of selected social situations, vocabulary control has been carefully exercised.

Recommendations to Teachers. Carrying out the following suggestions will result in successful pupil achievement:

1. In the initial learning stage, take time to help pupils grasp the meaning and relation of number facts, understand the explanations and directions, the new steps in the fundamental operations, and the new type-problem situations.

2. Stress accuracy rather than speed. Allow pupils to work at the speed best adapted to their own needs. See that pupils take time to do accurate work, to prove their work, to find and correct their errors, and to find the reasons for any incorrect work.

The Authors

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Unit 1. Review of Addition

Watch Your Progress in Arithmetic

You will find it is fun to keep each day's arithmetic papers in a file and to see how much you can improve in accuracy from week to week. In arithmetic, as in your games, you will improve if you take time for practice.

The following suggestions will help you improve your work and enjoy your arithmetic: (1) Read every problem carefully. Always decide how you will solve a problem before you begin writing. (2) Practice writing neat, correct figures and drawing straight lines. (3) Work slowly enough so that you get all answers right the first time. (4) If anything in the day's work is not clear, let your teacher know that you do not understand it.

Write the answers on folded paper for the examples in each row.

1.	9	3	6	7	9	8	6	5	8
	5	8	4	7	3	2	9	7	5
2.	7	8	4	9	4	6	9	5	9
	3	7	2	8	5	7	4	5	7
3.	7	4	9	8	5	7	8	4	6
	5	6	9	3	4	6	9	8	5
4.	4	8	5	3	5	7	6	3	8
	7	8	6	9	8	9	6	9	6
5.	5	8	3	6	2	9	7	4	7
	9	4	7	8	9	6	4	9	8

Steps in Solving Problems

First: Find the facts that the problem tells.
Second: Find the question that must be answered.
Third: Decide the operation to use in solving the problem.
Fourth: Do neat and accurate work.

1. Jim bought a speller for 60¢ and a tablet for 8¢. Find the cost.

$$\begin{array}{r} 60¢ \\ +8 \\ \hline 68¢ \end{array}$$

2. Bob had some chickens and sold 6. Then he had 14 left. How many did he have at first?

3. At an average speed of 45 miles per hour, how far will an automobile travel in 3 hours?

4. Joyce had 27¢ and earned 83¢. How much money did she have then?

$$\begin{array}{r} \$.27 \\ +.83 \\ \hline \$1.10 \end{array}$$

5. Walter bought a ball for 15¢ and gave the clerk a quarter. What was his change?

Practice for Accuracy

Add. Begin at the top and add downward. Then check the sums by adding upward. Use folded paper.

1.	6	2	3	5	6	2	3	5	8
	1	7	2	5	3	5	7	3	2
	8	5	8	4	9	7	6	8	9
2.	6	3	8	6	3	5	3	7	4
	2	7	1	4	5	4	3	2	3
	7	8	3	5	4	6	9	4	9
3.	7	6	8	5	9	7	5	6	8
	9	5	6	4	9	6	7	7	9
	5	8	9	6	8	7	8	5	8

Practice in Solving Problems

1. Howard earned \$11 and spent \$5. How much money did he have left?

2. Louis saved 70¢ to buy a knife costing \$1.50. How much more money did he need?

\$1.50
−.70
\$.80

3. How many desks are needed for 6 rows, with 8 desks in each row?

4. Margaret had \$29 in the bank and put in \$7 more. How much money did she have in the bank then?

Practice in Addition

1.	9	5	6	9	7	4	8	7	9
	6	8	6	9	8	9	6	9	4
2.	7	5	9	4	8	5	9	4	7
	8	9	8	5	4	8	3	8	5
	5	6	7	9	3	8	6	9	7
3.	8	6	5	9	4	8	5	9	6
	7	9	6	4	7	3	2	7	6
	7	4	6	9	4	7	8	6	5
4.	37	58	36	49	39	67	34	68	
	58	76	49	39	64	35	89	49	
	53	96	75	78	53	84	47	56	
5.	38	69	57	48	56	29	57	37	
	24	58	26	87	87	45	69	97	
	76	86	98	86	58	89	74	35	
6.	39	78	49	58	26	49	57	48	
	43	35	36	43	58	27	94	78	
	79	67	59	94	69	84	28	57	

Practice for Accuracy

Add and check. Write the sums on folded paper.

1.	3	3	9	5	6	5	3	8	8
	7	9	5	6	7	3	4	3	8
	5	4	6	3	4	7	6	8	4
	6	5	6	7	5	7	8	9	7
2.	3	6	7	8	9	5	9	6	9
	9	5	6	9	3	2	3	3	9
	3	4	5	6	5	8	4	8	6
	8	9	2	7	4	5	7	4	6
3.	5	9	3	7	5	4	8	9	4
	9	8	8	7	8	7	6	7	8
	5	7	8	4	6	5	1	5	6
	6	3	9	3	8	6	4	6	7

The Roadside Stand

Last summer Bob put up a fruit and vegetable stand.

1. He bought 9 watermelons for 23¢ each. How much did he pay for them?

$.23
×9
$2.07

2. He placed 35 melons in 5 equal rows. How many were there in each row?

3. He bought fifty bunches of onions for 65¢ and sold them for $1.95. How much did he make on the onions?

4. Bob bought 4 crates of berries at $1.15 each. How much did the berries cost him?

5. He sold $13.95 worth of strawberries the first month and $8.45 worth the second month. How much did he sell in the two months?

6. Bob's sales were $34.65 in June, $58.34 in July, and $23.07 in August. Find his total sales.

Problems in Buying Groceries

1. Mrs. Davis paid \$2.19 for fruit and \$1.72 for groceries. How much did she pay for both?

2. At 4¢ a pound, how many pounds of tomatoes could Virginia buy for 40 cents?

3. After buying groceries that cost 65¢, Jerry had 30¢ left. How much money did he have at first?

4. Mrs. Wilson's bill amounted to \$3.50. How much change should she have received from \$5.00?

5. Martha paid 50¢ for peaches, 32¢ for oranges, and 45¢ for potatoes. How much did she spend?

6. Jim had a box of potatoes weighing 65 lb. The empty box weighed 4 lb. What did the potatoes weigh?

Exercises in Addition

1.	37	28	96	46	69	45	87	48
	54	34	68	56	92	84	99	55
	96	97	47	43	29	77	26	67
2.	84	16	87	47	88	74	32	47
	47	98	67	98	38	18	58	79
	26	69	38	76	76	79	99	67
3.	62	97	67	97	74	69	43	82
	89	82	95	49	59	56	86	98
	77	78	69	88	79	39	69	67
	35	59	76	79	35	95	74	78
4.	16	82	59	38	68	87	27	19
	82	49	64	79	37	50	84	49
	77	70	98	65	56	47	48	42
	90	38	46	27	39	58	56	84

Practice in Addition

Add and check. Write the sums only.

1.

7	2	7	6	8	6	8	5	9
5	4	6	4	6	3	9	4	7
4	3	8	7	8	5	9	7	3
2	7	5	8	4	9	7	9	8

2.

5	9	8	5	6	4	3	7	5
7	5	9	7	8	9	5	7	9
9	5	7	9	7	4	4	8	7
8	5	4	7	8	6	9	5	6
9	7	9	8	9	7	5	6	7

3.

7	5	9	4	7	8	7	5	9
8	5	4	5	7	8	9	9	6
6	9	4	4	8	7	8	9	4
7	9	9	7	7	5	9	8	3
7	8	4	9	4	3	5	3	8

4.

16	82	59	38	68	87	27	19
82	49	64	79	37	50	84	49
77	70	98	65	56	47	48	42
29	97	67	34	80	94	73	95
90	38	46	27	39	58	56	84

5.

56	75	646	98	736	837
348	996	13	49	80	49
52	78	95	575	435	43
583	57	55	76	16	138
78	598	844	283	98	61

6.

97	59	17	59	534	479
828	406	658	546	682	529
82	54	74	59	755	797
542	69	69	247	936	679
93	397	475	48	683	746

Unit 2. Review of Subtraction

Proving Subtraction

1. A farmer had 267 sheep. He sold 159. How many sheep did he have then?

To solve, subtract 159 from 267.

267, minuend
159, subtrahend
108, remainder

You cannot take 9 ones from 7 ones. So take 1 ten from 6 tens and think $10+7=17$ ones.

Ones: Think $17-9=8$. Write 8 in ones' place.
Tens: Think $5-5=0$. Write 0 in tens' place.
Hundreds: Think $2-1=1$. Write 1 in hundreds' place.

To prove the answer, add the subtrahend and the remainder. Compare this sum with the minuend. If they are the same, the answer is correct.

Subtract the numbers below. Prove the answers.

2.	17	27	22	38	92	70	91	52
	4	23	3	9	18	52	83	46
3.	366	786	148	122	745	592		
	232	641	87	90	518	117		
4.	409	706	980	892	880	910		
	386	296	731	245	843	614		
5.	\$4.63	\$50.54	\$40.04	\$72.04	\$75.00			
	2.79	37.89	32.67	36.48	29.84			
6.	\$8.67	\$46.15	\$80.00	\$93.65	\$75.06			
	4.59	25.88	68.47	79.83	15.49			

Making Change

1. Martha bought crayons for 12¢ and gave the clerk 25¢. What was her change?

The clerk gave Martha the crayons, saying, "12." Then he gave her 3 cents, saying, "13, 14, 15." Then he gave her a dime, saying, "25." He began with the amount of the purchase and added enough to make 25¢.

For the following, write the numbers the clerk would say in making change. Then write the amount of the change.

	Amount of Purchase	Money Used		Amount of Purchase	Money Used
2.	9¢	25¢	**3.**	$1.02	$1.50
4.	20¢	50¢	**5.**	$1.10	$2.00
6.	28¢	50¢	**7.**	$1.56	$2.00
8.	15¢	50¢	**9.**	$1.43	$2.00
10.	53¢	75¢	**11.**	$2.56	$2.75
12.	57¢	75¢	**13.**	$2.04	$3.00
14.	36¢	$1.00	**15.**	$3.17	$4.00
16.	54¢	$1.00	**17.**	$1.25	$5.00
18.	78¢	$1.00	**19.**	$2.98	$5.00
20.	29¢	$1.00	**21.**	$3.83	$5.00
22.	15¢	$1.00	**23.**	$2.37	$5.00

Everyday Problems

Find the facts that are given and the question that is asked. After you have decided how to solve the problem, take time to do neat work. Then check the answer and name it correctly.

1. Susan wants to buy a girl-scout uniform for $4.50. She has saved $2.59. How much more money must she save for the uniform?

2. When the price of coal is $7 a ton, what is the cost of 14 tons of coal?

3. If you buy a hat for $2.75, how much change should you get from a $5 bill?

4. Mr. Harrison paid $28 for 7 loads of wood. What was the price per load?

5. Harold raised 143 bushels of potatoes and sold 97 bushels. How many bushels did he keep?

6. Jerry and his father drove 876 miles the first week of a motor trip and 958 miles the second week. How far did they drive in the two weeks?

7. A table that sold for $28.50 has been reduced $5.25. What is the price now?

8. Mrs. Davis gave the grocer a $10 bill to pay for $2.47 worth of groceries. What was her change?

9. Louis' father paid $54.75 for a radio, $7.49 for a table, and $4.65 for a chair. How much did he spend?

10. A suit that had sold for $15 was placed on sale at $12.50. How much cheaper was the suit then?

11. Mr. Jones was born in 1897. How old was he in 1946?

12. After spending $8.99 of his earnings this summer, Arthur had $28.26 left. How much had he earned?

Practice for Accuracy

Add and check:

1.

19	9	58	14	8	26	6	28
6	23	36	7	18	9	7	59
78	47	5	9	7	44	17	63

2.

49	65	57	29	58	78	69	46
10	53	31	8	49	47	88	7
24	12	28	42	6	80	6	98

3.

88	69	36	48	59	78	46	67
70	90	52	39	92	65	88	45
33	41	70	60	90	86	94	76
49	13	64	67	94	47	39	57

4.

$17.56	$25.84	$39.10	$45.09	$8.69
9.68	47.39	80.98	76.70	5.48
54.56	8.75	.85	47.94	6.66
7.63	56.37	7.74	6.51	1.89
87.74	79.68	56.47	68.48	7.80

Subtract the following. Prove the remainders.

5.

965	727	917	353	992	863
578	639	338	266	597	667

6.

920	800	942	630	434	853
777	132	669	553	39	85

7.

724	434	961	585	404	849
655	288	489	276	195	353

8.

247	956	563	762	445	638
173	299	424	538	347	494

Reading and Writing Roman Numerals

The Romans wrote numbers by means of seven letters, the values of which are given below:

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

Ones:	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Tens:	**X**	**XX**	**XXX**	**XL**	**L**	**LX**	**LXX**	**LXXX**	**XC**
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**
Hun-	**C**	**CC**	**CCC**	**CD**	**D**	**DC**	**DCC**	**DCCC**	**CM**
dreds:	**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**

In this table of Roman numerals you will find six numbers in which the first letter has a smaller value than the second: IV, IX, XL, XC, CD, CM. To read these numbers, subtract the value of the first letter from the value of the second. Thus, IV = 5 − 1, or 4. IX = 10 − 1, or 9. XL = 50 − 10, or 40. XC = 100 − 10, or 90. CD = 500 − 100, or 400. CM = 1000 − 100, or 900.

For other numbers, add the values of the letters. Thus, II = 1 + 1. III = 1 + 1 + 1. XX = 10 + 10. LX = 50 + 10, or 60. XXX = 10 + 10 + 10, or 30. You can see that MCMXLII = 1000 + 900 + 40 + 2, or 1942.

V, L, or D are never repeated nor their values ever subtracted in the same number.

1. Write in figures: XI, XIV, XLV, LVIII, CXIX, CXLIV, CMX, MCMXLI, MCDXCII, DCX, MDCCCLXXXVIII.

2. Make a list of the Roman numerals you find in books and magazines and on monuments and cornerstones.

3. Write the Roman numerals for these numbers: 11, 19, 29, 38, 47, 54, 66, 75, 83, 92, 1776, 1865, 1934, 1944.

Practice in Subtraction

1.	1288 434	6172 250	3159 806	7586 6273	8464 8219
2.	9744 4286	6954 3489	9553 7268	9686 1980	4315 3542
3.	7207 3648	8211 1837	7254 4479	7445 7056	6754 5985
4.	6291 3392	6826 1947	6624 4978	7745 1957	8001 6089
5.	$5.00 3.42	$89.33 58.74	$50.64 37.65	$80.05 35.39	$65.72 21.28
6.	$6.50 4.95	$88.60 39.88	$71.71 43.07	$90.00 21.03	$21.28 2.89

Problems

1. In what year were you born? In what year will you be 15 years old?

2. Nan was born in 1938. How old was she in 1946?

3. Four boys bought a tent for $12. What was each boy's share of the cost?

4. Esther had $7. After paying $6.25 for a coat, how much did she have left?

5. Howard has $2.50. How much more does he need to buy a pair of skates for $4?

6. Jim and his father can go 7 miles per hour in their small boat. How long will it take them to go 63 miles?

Unit 3. Review of Multiplication and Division

Multiplying by Two-Figure Multiplier

1. There are 24 hours in one day. How many hours were there in February, 1941?

To solve, multiply 28 by 24.

Think $4 \times 8 = 32$. Write 2 in ones' place. Carry 3 to tens' place.
Think $4 \times 2 + 3 = 11$. Write 11.
The partial product is 112.
Think $2 \times 8 = 16$. Write 6 in tens' place.
Carry 1 to hundreds' place.
Think $2 \times 2 + 1 = 5$. Write 5 in hundreds' place.
The partial product is 5 hundreds and 6 tens, or 560.
Then add 112 and 560. The product is 672.

28, multiplicand
24, multiplier
112, partial product
56 , partial product
672, product

To check, multiply the multiplier by the multiplicand. Then compare the two products. If they are the same, the answer is probably correct.

When you multiply by a two-figure multiplier, write the final number in each partial product in the same column that the multiplier is in.

Multiply the numbers below. Check:

2.

32	43	37	85	38	17	89	69
23	40	46	47	56	27	38	54

3.

468	735	795	687	346	679
26	37	84	59	89	67

4.

$2.40	$3.15	$12.50	$13.45	$34.06
7	4	6	9	8

A Contest in Making Problems

The pupils are exchanging their problems in class. Try to get the correct answer for each problem.

1. *Walter:* My mother paid $10.50 for my suit and $11.25 for my older brother's suit. My brother's suit cost how much more than mine?

2. *Henry:* I am saving money to buy my mother a Christmas present. If I save 5¢ each week, how long will it take me to save 45¢?

3. *Lucy:* Yesterday I went to the store and bought a loaf of bread for 7¢, pork chops for 65¢, and a can of peas for 17¢. How much did I spend?

4. *Martha:* The temperature this morning was 49°. It is now 67°. How many degrees warmer is it now?

5. *Susan:* We live 5 miles from school. This morning my father brought me to school in his car in 15 minutes. What was our average time per mile?

6. *Violet:* Last January I decided to save $1.50 by Christmas. I have saved 93¢. How much more must I save?

7. *Jerry:* Last Monday I left the schoolroom at 12:05 P.M. and returned at 12:45 P.M. How long was I gone?

8. *Arthur:* On Saturday my father and I drove 200 miles in 5 hours. What was our average speed?

9. *Harold:* My father gives me an allowance of 10¢ a week. How much money does he give me in 1 year?

Mixed Practice

Find the answers. Check your work.

1.	78	154	97	75	117	197
	×67	×89	−8	×6	−49	×48
2.	64284		52900	786	656	469
	−36895		−47937	9	309	78
				68	64	956
				474	8	75
3.	10120		96544	97	46	787
	−7458		−87599	669	327	64
4.	47	84	64	758	665	538
	×58	×79	×74	77	71	885
				9	418	79
				84	594	67
5.	86	67	400	927	266	946
	+74	−47	−297	448	7	54

Practice in Solving Problems

1. Howard's father bought 9 chairs for $18. What was the average price?

2. Mr. West's car runs 17 mi. on a gallon of gasoline. How far can it run on 13 gallons?

$$\begin{array}{r} 17 \\ \times 13 \\ \hline \end{array}$$

3. A farmer bought a farm of 78 acres at $45 per acre. How much did he pay for it?

4. The population of Cedar City was 2405 ten years ago. Now the population is 4576. What is the gain?

5. Mr. Ray received $870 for house rent and paid $227.75 for taxes and repairs. How much did he have left?

6. The Jackson School bought 42 new desks. At $8.50 each, what was the cost of the desks?

Practice in Solving Problems

Find the facts and the question. Decide how to solve the problem. Do neat and accurate work.

1. A floor is 30 feet wide and 48 feet long. How many sq. ft. are there in this floor? (Length $\times$ width = area.)

2. At 7¢ a gallon for fuel oil, how much are 675 gallons worth?

3. In a town having 8174 voters, 3987 voted at the last election. How many did not vote?

4. Four boys shared $48 in expenses for a four weeks' camping trip. What was each boy's share?

5. Mr. Jones saves $2 a week. How many weeks will it take him to save $14?

6. At an average speed of 167 miles an hour, how far will an airplane fly in 14 hours?

7. At the rate of 36¢ a gallon for milk, what is the price per quart? (1 gal. = 4 qt.)

$4\overline{)36}$

8. What does a teacher earn in a school year if she is paid $130 a month for 9 months?

9. Edith paid $2.89 for a jacket, $1.75 for a hat, and $2.96 for shoes. What amount did she spend?

10. At 6¢ a pound, what is the value of a cow that weighs 1078 pounds?

11. Harold worked 7 weeks this summer. How much did he have to save each week to buy a bicycle for $21?

12. How many square feet of linoleum will it take to cover a floor 9 feet wide and 14 feet long?

13. What is the average speed of a boat that goes 240 miles in 6 hours?

Division with Remainder

1. At 5¢ each, how many ice-cream cones can Harold buy for 23¢?

To solve, divide 23 by 5.

$$5\overline{)23}\quad 4r3$$

The solution is shown at the right.

Harold can buy 4 cones and have 3 cents left.

The **divisor** is 5. The **dividend** is 23. The **quotient** is 4. The **remainder** is 3.

To prove, multiply the quotient by the divisor and add the remainder. If this answer and the dividend are the same, the quotient is correct.

Divide the following:

2.	$5\overline{)9}$	$5\overline{)17}$	$5\overline{)12}$	$4\overline{)7}$	$2\overline{)11}$	$5\overline{)13}$
3.	$4\overline{)10}$	$5\overline{)14}$	$5\overline{)7}$	$5\overline{)16}$	$3\overline{)8}$	$4\overline{)14}$
4.	$2\overline{)13}$	$3\overline{)11}$	$5\overline{)19}$	$4\overline{)15}$	$4\overline{)9}$	$4\overline{)18}$
5.	$2\overline{)9}$	$5\overline{)39}$	$5\overline{)11}$	$2\overline{)7}$	$3\overline{)14}$	$5\overline{)13}$
6.	$5\overline{)23}$	$5\overline{)38}$	$3\overline{)7}$	$5\overline{)18}$	$4\overline{)19}$	$4\overline{)30}$
7.	$4\overline{)23}$	$4\overline{)11}$	$3\overline{)10}$	$2\overline{)15}$	$5\overline{)43}$	$4\overline{)39}$

Problem Practice

1. One radio costs $68.76, and another costs $54.69. How much cheaper is the second radio?

2. If Henry saves 5¢ a week from his allowance, how much does he save in a year of 52 weeks?

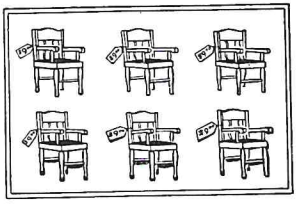
3. Jim paid $2.49 for a football, $1.75 for a jacket, and 75¢ for a cap. Find the cost.

4. There are 279 pupils in the 9 rooms of the Wilson School. What is the average number per room?

Sight Problems

Solve each problem without writing the figures.

1. Susan had 50¢ to buy her lunch. She has 32¢ left. How much did she spend?



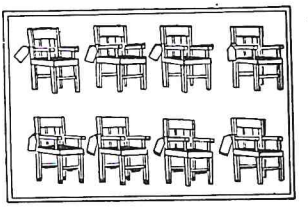
2. What do 6 chairs cost at $9 each?

3. Jerry saves 20¢ a month. How much does he save in one year?

4. Mrs. Brown paid a meat bill of $8.40. How much change did she get from $10?

5. Joyce paid 10¢ for a box of crayons, 5¢ for two pencils, and 2¢ for an eraser. How much did she spend?

6. Bob's mother spent 15¢, 25¢, and 10¢ for telephone calls. What was the total cost?



7. The cost of 8 chairs is $56. What is the price per chair?

8. Harold earned 60¢ for 3 hours' work. What was he paid per hour?

9. How many square yards are there in a rug 5 yards long and 4 yards wide?

10. Walter earned $12 in 3 months. What was his average income per month?

$$3\overline{)\$1.20} \quad \$ .40$$

11. Three boys earned $1.20. What was each boy's share of the money?

12. What is Louis' profit on 35 papers at 2¢ per paper?

13. There are 42 children in our class. Yesterday 39 were present. How many were absent?

14. When milk sells for 12¢ a quart, what is the cost of 1 quart per day during the month of November?

Unit 4. Practice in Division

Carrying in Division

1. In 4 months Howard saved 172 stamps. How many did he save per month?

To solve, divide 172 by 4.

$$4\overline{)172}\quad 43$$

Think $17 \div 4 = 4$r1. Write 4 in tens' place.
Carry 1 ten to ones' place. $10+2=12$.
Think $12 \div 4 = 3$. Write 3 in ones' place.
The quotient is 4 tens and 3 ones, or 43.

To prove, multiply the quotient, 43, by the divisor, 4. $43 \times 4 = 172$. Compare the product, 172, with the dividend, 172. Since they are the same, the answer is correct.

Prove the division for each example below:

2.	$3\overline{)69}$ 23	$4\overline{)128}$ 32	$4\overline{)96}$ 24	$3\overline{)147}$ 49	$5\overline{)335}$ 67
3.	$5\overline{)150}$ 30	$5\overline{)205}$ 41	$4\overline{)144}$ 36	$3\overline{)150}$ 50	$3\overline{)228}$ 76

Find the quotients. Prove your work.

4.	$3\overline{)17}$	$5\overline{)44}$	$4\overline{)24}$	$5\overline{)37}$	$2\overline{)18}$	$4\overline{)25}$
5.	$5\overline{)46}$	$2\overline{)17}$	$4\overline{)27}$	$5\overline{)35}$	$3\overline{)20}$	$5\overline{)47}$
6.	$3\overline{)129}$	$4\overline{)288}$	$5\overline{)305}$	$3\overline{)231}$	$2\overline{)196}$	
7.	$3\overline{)624}$	$3\overline{)276}$	$4\overline{)412}$	$4\overline{)216}$	$5\overline{)290}$	
8.	$4\overline{)836}$	$5\overline{)540}$	$2\overline{)116}$	$4\overline{)300}$	$3\overline{)177}$	

The Amusement Park

Harold and Arthur went to an amusement park.

1. They rode on the Ferris wheel, which lifted them 94 ft. above the ground. The near-by tracks of the roller coaster were 37 feet above the ground. How many feet above the tracks did the Ferris wheel lift the boys?

2. The roller coaster traveled around the tracks at an average rate of 36 mi. per hour. How many miles did it travel in 30 minutes? in 15 minutes?

3. The "strong man," weighing 213 lb., could lift 463 lb. How much more could he lift than his own weight?

4. They rode on the merry-go-round, which went around 360 times in one hour. How many times did it go around in 30 minutes?

5. While the boys watched, the man who guessed people's weights guessed wrong 13 times and gave away 13 canes, which cost him a total of 39¢. He guessed right 22 times. In all he collected $2.20. How much did he gain or lose?

6. During the day Harold spent 55¢ for rides. At 5¢ a ride, how many rides did he take?

Practice in Division with Remainder

1. Prove the work in each example below:

$2\overline{)7}$ 3r1	$2\overline{)1}$ 0r1	$7\overline{)2}$ 0r2	$8\overline{)4}$ 0r4	$9\overline{)7}$ 0r7
$3\overline{)22}$ 7r1	$5\overline{)29}$ 5r4	$4\overline{)34}$ 8r2	$6\overline{)17}$ 2r5	$7\overline{)25}$ 3r4

2. Divide each number in lines (1) and (2) below by 2. Beginning with line (1), think $2\overline{)7}$. Write 3r1.

(1)	7	2	5	9	6	4	1	8	3	0
(2)	17	12	15	11	16	19	13	18	14	10
(3)	21	28	24	27	29	22	25	23	26	20
(4)	33	37	31	38	32	39	35	36	34	30
(5)	45	49	44	48	43	46	41	47	42	40
(6)	56	51	59	52	58	53	57	55	54	50
(7)	66	63	67	64	69	61	65	68	62	60
(8)	79	73	74	77	78	72	75	71	76	70
(9)	83	87	82	88	85	89	86	81	84	80

3. Divide each number in lines (1) to (3) by 3.

4. Divide each number in lines (1) to (4) by 4.

5. Divide each number in lines (1) to (5) by 5.

6. Divide each number in lines (1) to (6) by 6.

7. Divide each number in lines (1) to (7) by 7.

8. Divide each number in lines (1) to (8) by 8.

9. Divide each number in lines (1) to (9) by 9.

Practice in Subtraction

1.	\$8.13 2.65	\$56.32 4.84	\$39.63 21.79	\$72.41 17.32	\$71.68 29.88
2.	\$6.33 5.37	\$84.53 38.69	\$15.54 6.89	\$93.45 76.08	\$41.12 4.76
3.	\$971.92 302.99	\$702.53 208.84	\$953.45 368.46	\$300.24 276.66	
4.	\$469.59 270.66	\$728.34 435.09	\$766.38 438.83	\$917.64 663.26	
5.	\$315.24 230.93	\$825.46 621.59	\$445.94 366.75	\$222.13 195.17	
6.	\$385.72 117.88	\$107.53 58.94	\$114.53 89.58	\$832.54 35.86	
7.	\$575.32 489.64	\$637.37 155.58	\$928.11 479.65	\$574.23 269.44	

Problem Practice

1. Fifty-four desks were placed in 6 equal rows. How many desks were there in each row?

2. Mr. Bond's income is \$150 each month, and his expenses are \$110. How much can he save each month?

3. How many days are there in 52 weeks?

4. Mr. Brown drove 2351 miles from Chicago to Seattle, and 2297 miles on the return trip. How far did he drive?

5. How many hours are there in a year of 366 days?

Practice in Solving Problems

1. Violet's uncle was born in 1891. How old was he in 1942?

2. An overcoat, which has been reduced $4.75, is now selling for $11.25. What was the original price?

3. A suit that was marked $27.50 is now on sale for $19.95. How much has the price been reduced?

4. Margaret's mother was born in 1902. How old was she in 1940?

5. Louis is now 11 years old. He is 27 years younger than his father. How old is his father?

6. How many 5¢ bars of soap can you get for 40¢?

7. Write the numbers of these chapters in figures: Chapter XXXVII, Chapter XLIX, Chapter LXVII.

8. Jerry found MDCCCLXXXIX on the corner-stone of a church. In what year was the church built?

Practice in Division

1.	$6\overline{)12}$	$7\overline{)21}$	$8\overline{)16}$	$9\overline{)9}$	$6\overline{)14}$	$7\overline{)12}$
2.	$7\overline{)9}$	$8\overline{)10}$	$6\overline{)21}$	$9\overline{)12}$	$7\overline{)17}$	$8\overline{)40}$
3.	$6\overline{)32}$	$7\overline{)14}$	$8\overline{)23}$	$9\overline{)25}$	$9\overline{)18}$	$7\overline{)20}$
4.	$9\overline{)34}$	$8\overline{)48}$	$6\overline{)28}$	$7\overline{)26}$	$6\overline{)18}$	$8\overline{)31}$
5.	$6\overline{)40}$	$7\overline{)31}$	$9\overline{)40}$	$7\overline{)24}$	$8\overline{)38}$	$9\overline{)27}$
6.	$9\overline{)34}$	$7\overline{)28}$	$8\overline{)46}$	$7\overline{)34}$	$9\overline{)49}$	$8\overline{)24}$
7.	$9\overline{)50}$	$6\overline{)24}$	$9\overline{)53}$	$8\overline{)50}$	$9\overline{)36}$	$6\overline{)41}$
8.	$9\overline{)59}$	$8\overline{)32}$	$7\overline{)40}$	$6\overline{)50}$	$7\overline{)35}$	$8\overline{)52}$

Practice for Accuracy

1.	$9\overline{)61}$	$6\overline{)52}$	$8\overline{)61}$	$6\overline{)33}$	$7\overline{)41}$	$9\overline{)46}$
2.	$7\overline{)42}$	$9\overline{)54}$	$7\overline{)46}$	$9\overline{)68}$	$8\overline{)56}$	$9\overline{)70}$
3.	$8\overline{)69}$	$6\overline{)30}$	$9\overline{)71}$	$8\overline{)64}$	$6\overline{)53}$	$9\overline{)63}$
4.	$8\overline{)71}$	$6\overline{)59}$	$9\overline{)72}$	$7\overline{)52}$	$6\overline{)36}$	$7\overline{)49}$
5.	$9\overline{)75}$	$8\overline{)72}$	$6\overline{)42}$	$8\overline{)74}$	$7\overline{)61}$	$6\overline{)55}$
6.	$6\overline{)58}$	$8\overline{)79}$	$6\overline{)48}$	$7\overline{)68}$	$9\overline{)81}$	$9\overline{)78}$
7.	$9\overline{)80}$	$7\overline{)69}$	$9\overline{)85}$	$7\overline{)56}$	$6\overline{)56}$	$6\overline{)54}$

Practice in Solving Problems

Find the facts and the question. Decide how to solve the problem. Take time to get the right answer.

1. Which numbers less than 80 can be divided by 8 without a remainder?

2. Which numbers less than 90 can be divided by 9 without a remainder?

3. Walter's father bought 4 auto tires for $36. What was the price per tire?

4. At a speed of 8 miles per hour, how long will it take a boat to go 72 miles?

Distance ÷ speed = time

72 ÷ 8 = —?

5. A train ran 244 miles in 4 hours. What was its average speed per hour?

6. Susan left the house at 7:30 A.M. and returned at 11 P.M. How many hours was she gone?

7. There are 640 acres in a square mile, or section. At $75 per acre, what is the value of a section of land?

First Self-Test

Test Your Accuracy

Add and check:

1.	59	539	387	48	772	946
	876	97	581	180	94	832
	68	748	45	446	337	198
	929	57	526	62	556	35
	396	586	478	539	35	772
2.	42	544	978	99	858	949
	161	690	669	697	87	967
	87	78	50	870	229	78
	721	871	666	57	993	843
	423	538	990	659	846	625

Write the answers. Watch the signs.

3.	2346	5695	6846	6131	4136
	−1656	−1108	−5619	−3406	−1488
4.	4320	9149	7201	5587	4011
	−2388	−1468	−5622	−4684	−3559
5.	594	572	896	763	609	763
	×46	×73	×75	×84	×76	×69
6.	985	347	465	586	986	514
	×59	×23	×78	×87	×83	×51
7.	$4\overline{)36}$	$5\overline{)27}$	$4\overline{)38}$	$3\overline{)25}$	$5\overline{)23}$	$4\overline{)236}$
8.	$4\overline{)25}$	$5\overline{)19}$	$3\overline{)91}$	$5\overline{)34}$	$5\overline{)45}$	$3\overline{)234}$
9.	$5\overline{)29}$	$4\overline{)33}$	$3\overline{)28}$	$2\overline{)15}$	$5\overline{)35}$	$4\overline{)300}$

Test What You Have Learned

1. Find the sum of 8, 6, 9, 4, and 12.

2. What is the total of \$3, \$6, and \$8?

3. What is the difference between 25 and 40?

4. What is the product of 4 and 300?

5. If the divisor is 9 and the dividend is 63, what is the quotient?

6. If the minuend is 17 and the subtrahend is 8, what is the remainder?

7. The sum of two numbers is 23. One number is 9. Find the other number.

8. The difference between two numbers is 8. The smaller number is 9. What is the larger number?

9. The product of two numbers is 28. If one number is 7, what is the other?

10. If the divisor is 6 and the quotient is 4, what is the dividend?

11. Name the addends and the sum in $17+8+40=65$.

12. Name the quotient, the divisor, and the dividend in $63 \div 7 = 9$.

13. Name the multiplier and the multiplicand in 46×175. Then find the product.

14. Name the subtrahend, the minuend, and the remainder in $703-68=635$. How do you prove the subtraction?

15. Write in words: 50,065; 310,400; 12,640,508.

16. Write in figures: fourteen million five hundred forty-eight thousand two hundred seventy-five.

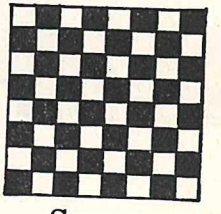
17. $8+3=__?$ $8-3=__?$ $8\times3=__?$ $8\div3=__?$

Unit 5. Area and Perimeter of Rectangles

Squares and Rectangles

A **rectangle** is a figure with four straight sides and four square corners. A square corner is called a **right angle.**

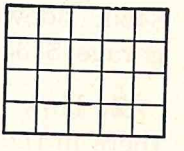
Rectangle



Square

A **square** is a rectangle with four equal sides. The **dimensions** of a rectangle are its length and its width.

1. Draw a rectangle 5 inches long and 4 inches wide. Divide the rectangle into 4 rows of squares with 5 squares in each row. The **area** of the rectangle equals the length times the width. $5 \times 4 =$ __ sq. in.?



The area of a rectangle is the space or surface that it covers. Small areas are measured in square inches, square feet, or square yards.

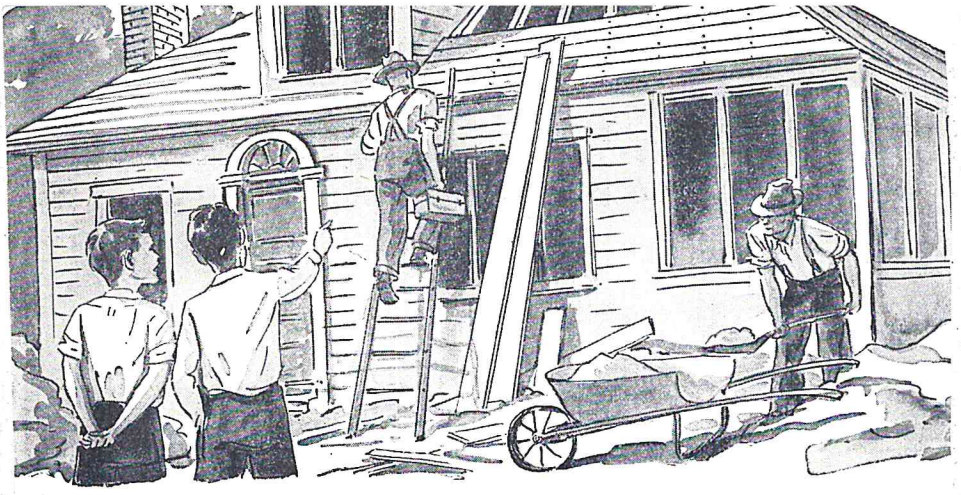
The **perimeter of a rectangle** is the distance around it. For the area or the perimeter of a rectangle both dimensions must be given in inches, feet, yards, or rods.

2. The **perimeter** of the rectangle equals two times the sum of the length and the width. $2 \times (5+4) =$ __ in.?

3. How many squares are there in one row of a checkerboard? How many rows are there on a checkerboard? What is the total number of squares?

4. Find the area and the perimeter of your schoolroom.

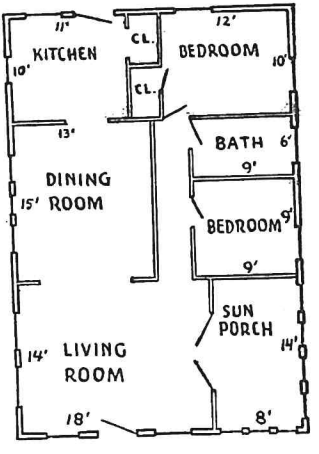
5. Measure a space 15 yd. wide and 25 yd. long on your school ground. Find the area and the perimeter.



House-Building Problems

Jim's father has bought a lot and is building a house.

1. The house costs \$4750; the lot, \$900; street paving, \$465; sidewalks, \$165; grading lot, \$125; sewers, \$85; garage, \$135. Find the total cost.



2. How many square feet are there in the floor of each room?

3. The basement floor is 39 ft. by 26 ft. Find the area.

4. How many feet of wall molding are needed for each bedroom?

5. What is the width of the hall? of each closet?

6. The garage is 12 ft. by 18 ft. How many square feet are there in the floor? how many square yards? At \$2.75 a square yard, what is the cost of a cement floor?

7. What will be the cost of a gas range at \$72.50 and an electric refrigerator at \$118.45?

Remainders in Division

1. How many weeks are there in a year of 365 days?

Divide 365 by 7.
Think $7\overline{)36}$. Write 5. Carry 1 to 5.
Think $7\overline{)15}$. Write 2.
Think remainder 1. Write *r*1.
There are 52 wk. 1 da. in a year of 365 days.

$$7\overline{)365} \quad 52r1$$

To prove, multiply 52 by 7 and add 1. The result is 365, the dividend. Prove without using pencil.
Think $7\times2+1=15$. See 5 in the dividend. Carry 1.
Think $7\times5+1=36$. See 36 in the dividend.

Divide the following. Prove your answers.

2.	$6\overline{)186}$	$7\overline{)294}$	$8\overline{)728}$	$9\overline{)639}$	$6\overline{)402}$
3.	$7\overline{)399}$	$8\overline{)472}$	$9\overline{)351}$	$8\overline{)384}$	$7\overline{)470}$
4.	$9\overline{)845}$	$8\overline{)740}$	$7\overline{)542}$	$8\overline{)640}$	$9\overline{)749}$
5.	$8\overline{)661}$	$9\overline{)294}$	$7\overline{)405}$	$6\overline{)530}$	$7\overline{)214}$
6.	$7\overline{)465}$	$8\overline{)750}$	$9\overline{)890}$	$6\overline{)425}$	$6\overline{)508}$
7.	$7\overline{)500}$	$9\overline{)253}$	$6\overline{)594}$	$8\overline{)154}$	$8\overline{)375}$
8.	$6\overline{)173}$	$7\overline{)203}$	$9\overline{)309}$	$8\overline{)192}$	$7\overline{)520}$

Can You Add and Subtract Correctly?

1.

78	13	46	64	15	67	92	84
89	57	28	75	26	45	63	97
32	92	94	86	49	89	78	59
45	46	34	97	37	67	46	36

2.

\$12.50	\$5.50	\$20.00	\$82.60	\$9.24
−2.95	−3.86	−17.63	−27.85	−.86

Practice in Division

1. At \$36.25 for a 5-day week, how much does Mr. Davis earn per day?

$$5\overline{)\$36.25}\quad \$7.25$$

Divide \$36.25 by 5 as usual. Place a decimal point in the quotient directly above the decimal point in the dividend. The quotient is \$7.25 as shown. To prove, multiply \$7.25 by 5.

Divide the numbers below. Prove your answers.

2.	$4\overline{)1512}$	$5\overline{)1927}$	$7\overline{)3927}$	$6\overline{)\$51.84}$
3.	$3\overline{)1445}$	$6\overline{)1987}$	$5\overline{)1577}$	$5\overline{)\$45.25}$
4.	$6\overline{)4539}$	$6\overline{)5861}$	$4\overline{)4500}$	$7\overline{)\$48.16}$
5.	$3\overline{)1349}$	$5\overline{)2300}$	$6\overline{)4255}$	$4\overline{)\$72.72}$
6.	$4\overline{)2108}$	$6\overline{)2370}$	$4\overline{)3767}$	$8\overline{)\$63.52}$
7.	$5\overline{)3957}$	$6\overline{)4579}$	$7\overline{)5994}$	$9\overline{)\$61.56}$
8.	$4\overline{)3957}$	$5\overline{)4952}$	$6\overline{)3647}$	$7\overline{)\$46.97}$
9.	$8\overline{)5548}$	$7\overline{)5394}$	$9\overline{)3483}$	$8\overline{)\$71.60}$
10.	$6\overline{)2306}$	$4\overline{)3091}$	$8\overline{)7160}$	$9\overline{)\$89.82}$
11.	$7\overline{)6582}$	$9\overline{)8808}$	$6\overline{)5869}$	$7\overline{)\$18.41}$
12.	$8\overline{)4968}$	$7\overline{)5501}$	$9\overline{)2617}$	$8\overline{)\$72.48}$

Finding Areas and Perimeters

Find the areas and the perimeters for the following:

	Length	Width	Length	Width	Length	Width
1.	4 in.	3 in.	6 in.	5 in.	8 in.	5 in.
2.	8 in.	3 in.	10 in.	6 in.	4 ft.	2 ft.
3.	6 ft.	4 ft.	8 ft.	6 ft.	9 ft.	7 ft.

Zeros in the Multiplier

To multiply a whole number by 10, annex one 0 to the number; to multiply by 100, annex two 0's; to multiply by 1000, annex three 0's.

$10 \times 4 = 40$ $100 \times 4 = 400$ $1000 \times 4 = 4000$

Multiply each number below by 10, by 100, and by 1000:

1.	6	32	67	245	145	$45	$18
2.	12	24	83	358	116	$643	$375
3.	85	9	27	678	323	$545	$428

4. Multiply 768 by 200.

Write two 0's in the product. Multiply 768 by 2 and write 1536 to the left of the 0's.

768
200
153,600

5. What was a salesman's commission, at $6.48 a set, for selling 400 sets of books?

Multiply $6.48 by 400. Point off two places for cents. Write the dollar sign.

$6.48
400
$2592.00

Multiply the following:

6.	294 × 900	367 × 80	394 × 60	768 × 600	988 × 40	$5.65 × 80
7.	293 × 50	685 × 70	352 × 70	798 × 40	626 × 70	$8.47 × 60
8.	678 × 80	607 × 90	296 × 60	690 × 50	308 × 50	$7.87 × 70

Find the area and the perimeter.

9.	10 ft.	7 ft.	8 yd.	4 yd.	6 yd.	6 yd
10.	8 yd.	7 yd.	9 rd.	5 rd.	7 rd.	4 rd

Zeros in Multiplier and Multiplicand

1. A machine makes 500 buttons an hour. How many buttons does it make in 170 hours?

Multiply 170 by 500. 170 ends in 1 zero, and 500 ends in 2 zeros. Write three 0's in the product. Multiply 17 by 5 and write 85 to the left of the 0's.

170
500
85,000

Give the products of the following:

2.	10×10	10×180	100×10	100×100
3.	10×20	20×20	100×20	100×750
4.	30×30	10×250	100×90	200×500
5.	40×40	40×30	300×40	400×100
6.	50×200	70×800	60×180	10×9000
7.	40×20	50×3000	20×7000	590×600
8.	50×50	380×400	70×600	760×800

Problems

1. At \$.15 each, what do 10 boxes of berries cost?

2. At wages of \$.85 an hour, how much does a man earn in 10 hours?

3. The total weight of 5 players on our basketball team is 290 pounds. What is the average weight?

4. Mr. Brown bought 85 feet of garden hose at 15¢ a foot. What was the cost?

5. At 13¢ each, how much will 300 apple boxes cost?

6. With 100 trees in a row, how many trees will be needed to plant an orange grove of 50 rows?

Unit 6. Multiplying by Three-Figure Multipliers

Exercises in Multiplication

1. A city block measures 542 feet by 376 feet. What is its area in square feet?

Multiply 542 by 376. Study the work at the right. Then do it with the book closed. To check, compare the two products.

542	376
376	542
3252	752
3794	1504
1626	1880
203,792	203,792

2. Multiply 674 by 807.

Multiply by 7. Write 4718. Do not multiply by 0. Multiply by 8. Write 5392. Notice that the 2 in 5392 comes under the 8 in 807. To check, multiply 807 by 674. Then compare the products.

674
807
4718
5392
543,918

Multiply the following. Check your answers.

3.	709	689	608	549	659	479
	456	294	348	784	706	328
4.	438	975	316	397	586	814
	673	584	868	927	258	407
5.	802	670	867	836	943	856
	343	108	836	600	860	276
6.	764	580	709	587	504	790
	600	900	490	218	609	470

Divide the following and prove your answers.

7. $6\overline{)4536}$ $6\overline{)5448}$ $5\overline{)2300}$ $9\overline{)\$75.15}$

Estimating Answers

Estimate the amount the answer should be. Then find the answer and compare it with your estimate.

1. Margaret is reading a book that contains 342 pages. She has read 187 pages. How many more has she to read?

2. Our car averages 16 miles on one gallon of gasoline. How far should it go on 16 gallons?

3. A farmer sold 613 sheep at $8.80 a head. How much did he get for his sheep?

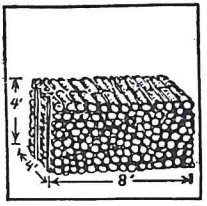
4. In one year 1167 pupils entered the Grant School, and 249 withdrew. How many pupils remained in school?

5. Mr. Davis bought 387 acres of land at $96 per acre. What was the cost of this land?

6. Mr. Harrison bought a hat for $3.45, a tie for 79¢, and socks for $1.26. What was the total cost?

7. Last summer Ed saved $1.75 each week from his earnings. How much did he save in 12 weeks?

8. What will 20 cords of wood cost at $6.35 per cord?



9. A room is 24 feet long and 18 feet wide. What is the area of the floor?

10. Henry's father paid $1.12 for 4 quarts of oil. What was the price per quart?

11. A farmer bought a drum of 125 gallons of gasoline at 17¢ a gallon. How much did he pay for it?

12. At an average speed of 45 miles per hour, how far will a train travel in 14 hours?

13. How many square rods are there in one square mile? (There are 160 square rods in an acre.)

Reading and Writing Large Numbers

Can you read these large numbers? In 1940 the population of the United States was 131,669,275. The total population of the world was estimated at 2,134,629,000.

To read the second number, begin at the left; say 2 billion, 134 million, 629 thousand.

With the help given below, you can read any large numbers which you may find in newspapers, magazines, or books. (1) Begin at the right and point off the number into periods of three figures each. (2) Remember that the names of the periods from right to left are units, thousands, millions, and billions.

billions	millions	thousands	units

Read the numbers in the following sentences:

1. The area of the United States, not counting possessions, is 3,026,789 square miles. The area of Canada is 3,694,863 square miles. Brazil, the largest country of South America, has an area of 3,275,510 square miles.

2. In June, 1941, there were about 45,200,000 telephones in the world; 22,705,000 in the United States.

3. In 1940 the railroads of the United States carried 453,892,999 passengers.

4. In 1940 the airlines of the United States carried 2,959,480 passengers.

Write the numbers below, point them off, and read them:

5.	180564	10017	5600000	6425836215
6.	800625	100701	128430065	125047006714
7.	123456	900099	123456789	1467859236
8.	100000	100000	100000000	1000000000

Mixed Practice

1.

6725	92643	526	58	709
−6546	−33749	39	465	73
		88	74	947
		791	86	68

2.

7247	43764	95	849	654
−4678	−35795	974	27	36

3.

769	367	854	96371	78264
×85	×69	×74	−57498	−68465

4.

494	49	689	8	357	25
9	479	68	62	49	364
58	96	6	678	88	56
796	7	73	495	867	58
79	928	771	7	34	787
998	887	926	398	976	59

5.

687	479	865	496	780	467
×34	×74	×48	×875	×460	×608

Find the wrong answers in the work below:

6.

70503	67504	92840	81010
−39497	−26493	−39237	−70976
30006	30011	53603	10044

7.

57	90*r*1	99*r*6	13*r*4	83*r*6
8)472	9)811	6)598	9)121	7)594

Divide the following. Prove your answers.

8. 9)8808 6)6976 5)2567 9)$83.97

9. 3)1183 5)3634 5)4317 8)$69.20

10. 7)2649 7)2509 9)2117 9)$38.07

Important Facts in Round Numbers

Read these sentences, in which the facts are stated in round numbers. Round numbers are more easily remembered.

1. The land and water area of the United States is about 3,000,000 square miles.

2. The greatest extent of the United States from east to west is about 3000 miles and from north to south about 1500 miles.

3. The population of the 48 states of the United States is over 130,000,000.

4. About 20,000,000 children attend the public elementary schools of the United States.

5. It is more than 4200 miles from the source of the Missouri River to the mouth of the Mississippi River.

6. The distance around the earth is about 25,000 miles.

7. The distance through the earth from pole to pole is about 8,000 miles.

8. Light travels about 186,000 miles a second.

9. The distance from the earth to the sun is about 93,000,000 miles.

10. Greater London has a population of over 8,600,000.

11. New York has a population of over 7,400,000.

12. The population of the Americas is over 265,000,000.

13. The population of the Eastern Hemisphere is about 1,845,000,000.

14. The land and water area of the earth is about 197,000,000 square miles.

15. China, with about 420,000,000 people, has a greater population than any other country in the world.

Practice in Solving Problems

Find the facts and the question. Decide how to solve the problem. Take time to get the right answer.

1. If it costs $846 a day to run a factory, how much does it cost to run this factory for 27 working days?

2. Mr. Davis had $148.60 in the bank. Then he deposited $375 and drew out $298.37. What was his balance in the bank?

3. Arthur's father sold 389 dozen eggs at 48¢ a dozen. How much did he get for his eggs?

4. A man was taking a motor trip of 643 miles. If at the close of the first day he still had 287 miles to go, how far had he traveled the first day?

5. A ship sailed 23 miles an hour. How far did it sail in 107 hours?

Practice in Division

1.	$5\overline{)227}$	$7\overline{)379}$	$6\overline{)770}$	$8\overline{)680}$	$4\overline{)\$7.84}$
2.	$9\overline{)359}$	$5\overline{)541}$	$6\overline{)179}$	$9\overline{)979}$	$6\overline{)\$4.86}$
3.	$5\overline{)346}$	$6\overline{)650}$	$8\overline{)826}$	$9\overline{)958}$	$7\overline{)\$5.39}$
4.	$6\overline{)558}$	$2\overline{)775}$	$3\overline{)430}$	$8\overline{)574}$	$8\overline{)\$8.64}$
5.	$4\overline{)381}$	$7\overline{)414}$	$6\overline{)599}$	$7\overline{)600}$	$7\overline{)\$4.97}$
6.	$3\overline{)895}$	$6\overline{)893}$	$4\overline{)751}$	$9\overline{)352}$	$8\overline{)\$7.92}$
7.	$7\overline{)730}$	$6\overline{)193}$	$5\overline{)496}$	$6\overline{)649}$	$9\overline{)\$8.91}$
8.	$6\overline{)659}$	$9\overline{)571}$	$7\overline{)769}$	$5\overline{)447}$	$5\overline{)\$8.95}$
9.	$7\overline{)760}$	$8\overline{)837}$	$9\overline{)179}$	$6\overline{)857}$	$6\overline{)\$5.04}$

Unit 7. Measures

Liquid and Dry Measures

1. Copy the kinds of measures. Then close your book and write the units of measures.

Kind of Measure	Units of Measure
(1) length or distance	inch, foot, yard, rod, mile
(2) area or surface	sq. in., sq. ft., sq. yd., sq. rd., acre, sq. mi.
(3) volume or content	cu. in., cu. ft., cu. yd.
(4) weight	ounce, pound, hundredweight, ton
(5) liquid	cup, pint, quart, gallon
(6) dry	pint, quart, peck, bushel
(7) value, price, or cost	cent, dollar
(8) temperature	degree of heat
(9) time	second, minute, hour, day, week, month, year

2. Milk, paint, and oils are sold by liquid measure. List several other liquids sold by liquid measure.

Liquid Measure	Dry Measure
2 cups (c.) = 1 pint (pt.)	2 pints = 1 quart
2 pints = 1 quart (qt.)	8 quarts = 1 peck (pk.)
4 quarts = 1 gallon (gal.)	4 pecks = 1 bushel (bu.)

3. The pints and quarts of liquid measure hold only about five-sixths as much as the pints and quarts of dry measure. Make a list of fruits, vegetables, and grains which are sold by dry measure or by weight.

Measures of Weight

16 ounces (oz.) = 1 pound (lb.)
100 pounds = 1 hundredweight (cwt.)
2000 pounds = 1 ton (T.)

Market prices of cattle, hogs, sheep, and potatoes are usually given by the hundredweight. This is also true of milk sold to creameries and of freight and express rates.

At the grocery store many foods and other articles are sold in cans or paper boxes. The weight of the contents is marked on each can or box. For example, a can of peas may be marked "net weight, 15 oz."

Hay and coal are sold by the ton. The capacity of ships is given in tons.

Prices of grain are given by the bushel, but the bushel is determined by weight. Potatoes and wheat weigh 60 lb. per bushel, and corn and rye weigh 56 lb. per bushel.

1. Make a list of the weights that you find on cans or boxes of different sizes.

2. Make a list of articles which are sold by weight in hardware stores, meat markets, and grocery stores.

Find the missing numbers in the exercises below:

3. 2 lb. = ___ oz. 3 cwt. = ___ lb. 3 T. = ___ lb.

4. $\frac{1}{2}$ lb. = ___ oz. $3\frac{1}{2}$ lb. = ___ oz. $\frac{1}{4}$ lb. = ___ oz.

5. $\frac{3}{4}$ lb. = ___ oz. $\frac{1}{2}$ T. = ___ lb. $\frac{3}{4}$ T. = ___ lb.

6. 1 T. = ___ cwt. 2 T. = ___ cwt. 10 T. = ___ lb.

7. 3 pt. = ___ c. 1 qt. = ___ c. 2 gal. = ___ qt.

8. 1 lb. 7 oz. = ___ oz. 3 lb. 5 oz. = ___ oz.

9. 24 oz. = ___ lb. ___ oz. 35 oz. = ___ lb. ___ oz.

10. 5000 lb. = ___ T. ___ lb. 25 cwt. = ___ T. ___ lb.

A Personal Cash Account

Edith receives a weekly allowance of $1.50 for school and personal expenses.

At the end of each month she balances her cash account by finding the total cash received, the total paid out, and the cash on hand. She adds the cash received and then the cash paid out. Next she takes the total paid out from the total received to find the cash on hand. Finally she writes the cash on hand under the total cash paid out.

1. Find the total cash Edith received during September.

2. Find the total cash paid out.

3. Find the cash on hand at the end of September.

Cash Received				Cash Paid Out			
Sept.				Sept.			
1	Cash on hand	$2	02	1	Ice-cream cone	$	05
3	Allowance	1	50	3	School supplies		35
10	Allowance	1	50	4	School books	1	53
14	Birthday gift	1	00	7	Lunches for week	1	07
17	Allowance	1	50	8	Movie		15
24	Allowance	1	50	8	Candy		10
	Total			14	Lunches for week		94
				21	Lunches for week	1	10
				22	Movie		15
				28	Lunches for week	1	08
					Total		
					Cash on hand		

Practice for Accuracy

Find the errors in the examples below:

1. $7\overline{)4926}$ $\quad 703r6$ $\qquad$ $8\overline{)723}$ $\quad 90r3$ $\qquad$ $8\overline{)8162}$ $\quad 1020r2$

2. $2\overline{)1708}$ $\quad 804$ $\qquad$ $9\overline{)405}$ $\quad 45$ $\qquad$ $3\overline{)2376}$ $\quad 795r1$

Give the missing numbers in the following exercises:

3. $\frac{1}{2}$ gal. = __ qt. $\qquad$ $\frac{1}{2}$ qt. = __ pt. $\qquad$ $\frac{1}{2}$ pt. = __ c.

4. 2 pk. = __ qt. $\qquad$ 3 pk. = __ pt. $\qquad$ 3 bu. = __ pk.

5. 1 gal. 1 qt. = __ qt. $\qquad$ 3 qt. 1 pt. = __ pt.

6. 1 qt. 1 pt. = __ c. $\qquad$ 2 gal. 2 qt. = __ qt.

7. 9 qt. = __ gal. __ qt. $\qquad$ 7 pt. = __ qt. __ pt.

Problems

1. What is the area of a field that is 94 rods long and 67 rods wide?

2. Mr. Allen paid \$43.75 for four new tires and \$28.75 to have his car painted. Find the cost.

3. I went to the store with \$14.87. After making my purchases, I had \$6.39. How much had I spent?

4. In an arithmetic game the scores made by one team were 175, 179, and 186. What was their total score?

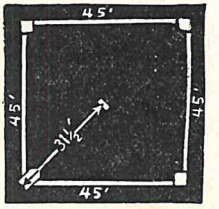
5. Our garage floor is 5 yards wide and 8 yards long. How many square yards are there in the floor?

6. The length of a rope is 117 feet. What is its length in yards?

7. When beef sells at eight dollars a hundredweight, what is the price per pound?

Play Ball!

During the summer Jerry went with Ed to watch an indoor baseball game.



1. Check the dimensions of your indoor diamond to see whether they agree with those in the picture.

2. The indoor diamond is a square, 45 feet on each side. How far must a player run to make a home run?

3. A player running from first to second base runs how many yards?

4. Is the distance from first to second base greater than the distance from third to home plate? Give reasons for your answer.

5. A regular baseball diamond is a square, each side of which is twice the length of the indoor diamond. What is the area of a baseball diamond?

Magic Squares

1. The square on the right contains all the figures from 1 to 9. Each figure is used only once. The sum of the figures in any row, column, or diagonal is 15. Add the figures to satisfy yourself that their sum is 15.

2	7	6
9	5	1
4	3	8

2. Add the numbers in each row, column, and diagonal of the lower-left square to see whether the sums are equal. If the sums are equal, this is a magic square. Then find the missing numbers in the other two magic squares.

16	2	3	13
5	11	10	8
9	7	6	12
4	14	15	1

25	11		22
14	20	19	
18	16	15	21
13		24	10

22		29	15
25	19	18	
	30	23	21
27	17		26

Practice for Accuracy

Find the wrong answers below and correct them:

1.	$6\overline{)405}$ 67r3	$9\overline{)514}$ 56	$8\overline{)4272}$ 709	$7\overline{)749}$ 107
2.	$9\overline{)666}$ 74r3	$6\overline{)568}$ 94r4	$7\overline{)377}$ 53r6	$8\overline{)724}$ 90r3

Divide the numbers below. Prove your answers.

3.	$4\overline{)8707}$	$9\overline{)3506}$	$5\overline{)2243}$	$2\overline{)\$39.70}$
4.	$5\overline{)1897}$	$5\overline{)3172}$	$4\overline{)2724}$	$7\overline{)\$45.64}$
5.	$7\overline{)5278}$	$9\overline{)3483}$	$6\overline{)2304}$	$9\overline{)\$68.67}$
6.	$4\overline{)8469}$	$8\overline{)7160}$	$7\overline{)6559}$	$8\overline{)\$57.92}$

Give the numbers missing in the following lines:

7. 1 bu. = ___ qt. $2\frac{1}{2}$ bu. = ___ pk. $4\frac{1}{2}$ pk. = ___ qt.
8. 8 qt. = ___ pk. 12 pk. = ___ bu. 64 qt. = ___ bu.
9. 3 pk. 2 qt. = ___ qt. 5 bu. 3 pk. = ___ pk.
10. 17 qt. = ___ pk. ___ qt. 19 pk. = ___ bu. ___ pk.

Problem Practice

1. If I read 316 pages in 4 days, how many pages did I average per day?

2. A man saved $16 weekly for 35 wks. How many dollars did he save?

3. A carpenter earned $94.50 in 9 days. How much did he average per day?

4. A farmer raised 434 bushels of potatoes on 3 acres. What was the average yield per acre?

Unit 8. Division by Two-Figure Divisors

Long Division

1. Ed wants to give 9 boys an equal share of 232 marbles. What is the largest number of marbles he can give each boy?

The examples at the right show how this problem is solved by (1) short division and (2) long division. In short division only the quotient is written. In long division all the steps are written.

Short Division	Long Division
25*r*7	25*r*7
9)232	9)232
	18
	52
	45
	7

2. Divide 382 by 10.

Divide: $10\overline{)38}$. Think $3 \div 1 = 3$.
Multiply: $3 \times 10 = 30$. Subtract: $38 - 30 = 8$.
Compare: Since 8 is less than 10, write 3 in the quotient in tens' place. Bring down 2.
Divide: $10\overline{)82}$. Think $8 \div 1 = 8$.
Multiply: $8 \times 10 = 80$. Subtract: $82 - 80 = 2$.
Compare: Since 2 is less than 10, write 8 in the quotient in ones' place. There is no number in the dividend to bring down. Write *r*2 in the quotient after the figure 8.

38*r*2
10)382
30
82
80
2

The steps in division are: (1) **divide,** (2) **multiply,** (3) **subtract,** (4) **compare,** (5) **bring down.**

3. Divide the numbers below. Prove your answers.

$10\overline{)376}$ $10\overline{)516}$ $10\overline{)132}$ $10\overline{)893}$ $10\overline{)399}$

Two-Figure Divisors Ending in 0

1. Mr. Jones pays Jack 30 cents an hour. Jack has earned \$6.45. How many hours has he worked?

To solve, divide the money Jack has by the amount of money he receives per hour.

$$\begin{array}{r} 21r15 \\ 30\overline{)645} \\ 60 \\ \hline 45 \\ 30 \\ \hline 15 \end{array}$$

Think 30 is greater than 6, so one must find how many times 30 is contained in 64.
$30\overline{)64}$. Think $6 \div 3 = 2$.
Multiply: $2 \times 30 = 60$. Subtract:
$64 - 60 = 4$.
Compare: Since 4 is less than 30, write 2 in the quotient in tens' place. Bring down 5.
$30\overline{)45}$. Think $4 \div 3 = 1r1$.
Multiply: $1 \times 30 = 30$. Subtract: $45 - 30 = 15$.
Compare: Since 15 is less than 30, write 1 in the quotient in ones' place. There is no number left in the dividend to bring down, so write $r15$ in the quotient after 1.
Jack worked over 21 hours.

Problems to Solve

1. Mary's father has a car that will run 20 miles on a gallon of gasoline. How many gallons of gasoline will it take for his car to go 460 miles?

2. Arthur earns \$6.40 a month delivering papers. If he works 20 hours a month, how much does he earn an hour?

3. Dick sold 30 bunches of radishes for \$1.50. How much did he get per bunch?

4. The fifth grade charged 10 cents admission to their play. They took in \$2.70. How many people went to the play?

Problems to Think Through

Decide the facts and find the question. Tell how to use the facts in answering the question.

1. If you know how much money a boy spent and how much he had at first, how do you find what he has left?

2. If you know a man's yearly income and the amount he saved in a certain year, how do you find the amount he spent that year?

3. If you know the number of pupils in each room of a school, how do you find the total number of pupils in the school?

4. If you know the cost of a number of books, how do you find the price of one book?

5. If you know how many papers a boy sells and the profit he makes on each, how do you find his total profit?

6. If you know your height in feet, how do you find your height in inches?

7. If you know the price of a steak and the amount of money you hand to the clerk, how do you find the amount of change you should receive?

8. If you know the length of a walk in feet, how do you find the length in yards?

9. If you know the cost of a dozen oranges, how do you find the price of one orange?

10. If you know the price of a dozen lemons, how do you find the cost of several dozen?

11. If you know the price of a hat, a suit, and a tie, how do you find the cost of all?

12. How do you change a number of inches to feet?

Two-Figure Divisors Ending in 1

1. The boys in Lincoln School wanted to arrange chairs in 21 rows of equal length. They had 783 chairs. What was the greatest number of chairs they could put in each row?

To solve, divide the total number of chairs by the number of rows they wanted.

$$\begin{array}{r} 37r6 \\ 21\overline{)783} \\ 63 \\ \hline 153 \\ 147 \\ \hline 6 \end{array}$$

Think 21 is greater than 7, so one must find how many times 21 is contained in 78.

$21\overline{)78}$. Think $7 \div 2 = 3r1$. Three is the estimated quotient figure.

Multiply: $3 \times 21 = 63$.

Subtract: $78 - 63 = 15$.

Compare: Since 15 is less than 21, write 3 in the quotient in tens' place. Bring down 3 from the dividend. The partial dividend is 153.

$21\overline{)153}$. Think $15 \div 2 = 7r1$. Seven is the estimated quotient figure.

Multiply: $7 \times 21 = 147$. Subtract: $153 - 147 = 6$.

Compare: Since 6 is less than 21, write 7 in the quotient in ones' place. There is no number left in the dividend to bring down, so write $r6$ in the quotient after 7.

The boys could place 37 chairs in each of 21 rows. They would have 6 chairs left over.

Divide the following. Prove your answers.

2.	$11\overline{)685}$	$11\overline{)399}$	$11\overline{)495}$	$11\overline{)132}$	$11\overline{)396}$
3.	$21\overline{)786}$	$11\overline{)896}$	$21\overline{)886}$	$11\overline{)793}$	$11\overline{)376}$
4.	$11\overline{)242}$	$21\overline{)609}$	$11\overline{)278}$	$11\overline{)893}$	$11\overline{)697}$
5.	$21\overline{)567}$	$11\overline{)794}$	$21\overline{)870}$	$11\overline{)899}$	$11\overline{)506}$

The Football Game

Last Saturday the Jackson High School football team played Washington High School at St. Charles.

1. It cost $5.25 to take the 21 players on the Jackson football squad to St. Charles. How much was the fare for each player?

2. The game began at 2:06 P.M. The first quarter ended at 2:33 P.M. How much time passed?

3. Thirty-two minutes passed while the team played the second quarter. Since there are 15 minutes of playing time in a quarter, how much time was taken out?

4. In the second quarter a Jackson player made a 46-yard punt. The ball was returned 17 yards. How many yards did Jackson gain on the play?

5. The Washington team gained 147 yards in 21 downs. How many yards, on the average, did the team gain per down?

6. The paid attendance at the game was 3,762. At 35¢ a ticket, what were the total gate receipts?

Two-Figure Divisors Ending in 2

1. The lamp shop sold 683 lamps in a year. What was the average number of lamps sold per month?

Think 12 is greater than 6, so one must find how many times 12 is contained in 68.

$12\overline{)68}$. Think $6 \div 1 = 6$. $6 \times 12 = 72$. Since 72 is 4 more than 68, the estimated quotient figure is 1 less than 6.

Multiply: $5 \times 12 = 60$.

Subtract: $68 - 60 = 8$.

Compare: Since 8 is less than 12, write 5 in the quotient in tens' place. Bring down 3.

$12\overline{)83}$. $8 \div 1 = 8$. $8 \times 12 = 96$. Since 96 is 13 more than 83, the estimated quotient figure is 2 less than 8.

Multiply: $6 \times 12 = 72$. Subtract: $83 - 72 = 11$.

Compare: Since 11 is less than 12, write 6 in the quotient in ones' place. There is no number left in the dividend to bring down, so write $r11$ in the quotient.

Proof: $12 \times 56 + 11 = 683$. The dividend is also 683.

$$\begin{array}{r} 56r11 \\ 12\overline{)683} \\ 60 \\ \hline 83 \\ 72 \\ \hline 11 \end{array}$$

Divide the following. Prove your answers.

2.	$21\overline{)452}$	$21\overline{)1426}$	$11\overline{)908}$	$21\overline{)2094}$
3.	$11\overline{)146}$	$11\overline{)1078}$	$12\overline{)537}$	$12\overline{)2746}$
4.	$21\overline{)876}$	$21\overline{)1466}$	$11\overline{)908}$	$21\overline{)1764}$
5.	$12\overline{)418}$	$21\overline{)1943}$	$21\overline{)984}$	$21\overline{)1827}$
6.	$12\overline{)297}$	$21\overline{)1498}$	$12\overline{)672}$	$21\overline{)1741}$
7.	$11\overline{)947}$	$21\overline{)1037}$	$12\overline{)526}$	$21\overline{)1984}$
8.	$11\overline{)607}$	$21\overline{)1449}$	$21\overline{)706}$	$21\overline{)1250}$
9.	$11\overline{)817}$	$21\overline{)1764}$	$21\overline{)960}$	$12\overline{)1000}$

Second Self-Test

Mixed Test

1. $95216 - 37879$

29	45	47	63	74	87
68	56	76	96	58	36
76	93	84	86	39	98

2. $30075 - 27649$

94	27	99	74	67	25
65	68	84	59	46	67

3. $73293 - 28597$ $\quad$ $73232 - 54649$ $\quad$ 842×49 $\quad$ 297×87 $\quad$ 674×86

4. $87391 - 41849$

94	85	63	88	58	92
48	67	38	58	39	58
37	30	32	49	72	66

5. $53350 - 45192$

16	14	58	76	96	79
23	28	85	37	47	46

6. $98418 - 35489$ $\quad$ $90082 - 41428$ $\quad$ 483×68 $\quad$ 789×35 $\quad$ 895×78

7. $7\overline{)4151}$ $\quad$ $9\overline{)3852}$ $\quad$ $11\overline{)737}$ $\quad$ $12\overline{)564}$

Testing What You Have Learned

1. What is the product of 458 and 64?
2. What is the difference between 806 and 1794?
3. Multiply 478 by 4. Add 375 to the product.
4. How much less is 1960 miles than 4025 miles?
5. Prove that $5033 - 965 = 4068$.
6. Begin at 3 and write by 3's to 33.
7. Write in words: 10,000; 110,000; 1,110,000.
8. Write in figures: 14 million, 60 thousand, 325.

Problem Test

Find the answer for each problem.

1. A bus travels at an average speed of 35 miles per hour. How far will it travel in 7 hours?

2. Joyce bought a doll for $1.45. How much change did she get from a $2 bill?

3. The average weight of the 11 players on our football team is 73 lb. What is the weight of the team?

4. How many peach trees will be needed to plant 8 rows of trees with 20 trees in each row?

5. Six boy scouts took a camping trip that cost $48. What was each boy's share of the expenses?

6. Alfred had 48¢. He received 43¢ from the sale of a book and 40¢ for running errands. How much money did he have then?

7. When steak sells at 40¢ per pound, what do 4 lb. cost?

8. After spending 38¢ for a drawing book, Walter had 65¢ left. How much money did he have at first?

9. At an average speed of 7 miles an hour, how long will it take a boat to go 35 miles?

10. Joyce wants a pair of roller skates costing $2.80. She has saved $1.60. How much more does she need?

Test on Measures

Find the missing numbers.

1.	2 ft. = ___ in.	4 yd. = ___ ft.	2 yd. = ___ in.
2.	4 qt. = ___ pt.	5 gal. = ___ qt.	1 gal. = ___ pt.
3.	$\frac{1}{4}$ mi. = ___ rd.	$\frac{3}{4}$ mi. = ___ rd.	5 lb. = ___ oz.
4.	32 oz. = ___ lb.	5 T. = ___ lb.	$\frac{3}{4}$ T. = ___ lb.

Unit 9. Two-Figure Divisors Ending in 1 and 2

Divisors Ending in 1

1. An orchard company bought 2356 trees to set in 31 equal rows. How many trees would there be in each row?

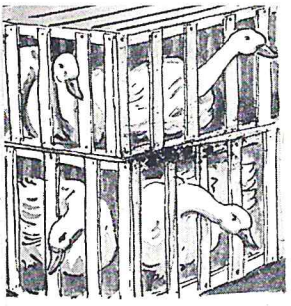
$31\overline{)235}$. Think $23 \div 3 = 7r2$.
Multiply: $7 \times 31 = 217$. Subtract: $235 - 217 = 18$.
Compare: 18 is less than 31. Write 7 in the quotient in tens' place. Bring down 6 from the dividend.
$31\overline{)186}$. Think $18 \div 3 = 6$. Multiply: $6 \times 31 = 186$.
Write 6 in the quotient in ones' place.

$$\begin{array}{r} 76 \\ 31\overline{)2356} \\ \underline{217} \\ 186 \\ \underline{186} \end{array}$$

Multiply the divisor by the estimated quotient figure and compare the product with the dividend before writing the figure in the quotient.

Divide the following. Prove your answers.

2.	$31\overline{)89}$	$31\overline{)168}$	$61\overline{)122}$	$31\overline{)229}$	$31\overline{)243}$
3.	$41\overline{)76}$	$31\overline{)186}$	$41\overline{)136}$	$41\overline{)118}$	$41\overline{)122}$
4.	$41\overline{)97}$	$41\overline{)346}$	$41\overline{)394}$	$41\overline{)361}$	$51\overline{)145}$
5.	$51\overline{)86}$	$51\overline{)150}$	$51\overline{)188}$	$51\overline{)365}$	$51\overline{)402}$
6.	$31\overline{)91}$	$61\overline{)189}$	$61\overline{)242}$	$61\overline{)374}$	$61\overline{)419}$
7.	$71\overline{)154}$	$71\overline{)217}$	$71\overline{)345}$	$71\overline{)421}$	$71\overline{)428}$
8.	$81\overline{)176}$	$81\overline{)224}$	$81\overline{)245}$	$81\overline{)396}$	$81\overline{)639}$
9.	$31\overline{)2854}$	$41\overline{)1288}$	$61\overline{)4198}$	$51\overline{)2893}$	$51\overline{)1464}$



Help in Finding Quotient Figures

1. Mr. Wilson sold 31 geese weighing 279 pounds. Find their average weight.

Since 31 is more than 27, divide 279 by 31. $31\overline{)279}$. Think $27 \div 3 = 9$. Multiply: $9 \times 31 = 279$. Subtract: $279 - 279 = 0$. Write 9 in the quotient. There is no remainder. The average weight of the geese was 9 pounds.

$$\begin{array}{r} 9 \\ 31\overline{)279} \\ \underline{279} \end{array}$$

When the second figure in the divisor is 1, use the first figure in the divisor to estimate the quotient figures.

Practice in Multiplication and Division

Without writing, give the products of the following:

1.	2×21	3×41	5×61	7×61	8×51	7×91
2.	5×41	8×31	6×71	9×61	2×61	3×91
3.	9×51	7×81	8×61	5×31	6×81	4×71

Without writing any figures, decide which of the following answers are not correct. Then write the correct quotients and remainders.

4.	$31\overline{)256}$ R 8	$21\overline{)198}$ R 9	$41\overline{)364}$ R 9	$61\overline{)489}$ R 8	$81\overline{)651}$ R 8
5.	$51\overline{)279}$ R 5	$31\overline{)178}$ R 5	$51\overline{)459}$ R 9	$61\overline{)304}$ R 5	$71\overline{)495}$ R 7
6.	$31\overline{)215}$ R 7	$51\overline{)420}$ R 8	$61\overline{)431}$ R 7	$71\overline{)572}$ R 8	$51\overline{)217}$ R 5
7.	$81\overline{)401}$ R 5	$91\overline{)545}$ R 6	$71\overline{)495}$ R 6	$41\overline{)368}$ R 9	$61\overline{)420}$ R 7

Practice in Division

1. Study these examples. Then do them without looking at the book. Prove each answer.

```
  237r26          798r43          442r74
41)9743         61)48721        81)35876
  82              427             324
 154              602             347
 123              549             324
 313              531             236
 287              488             162
  26               43              74
```

Divide the examples below. Prove your answers.

2.	$31\overline{)576}$	$21\overline{)1282}$	$21\overline{)4494}$	$91\overline{)6423}$
3.	$51\overline{)650}$	$31\overline{)3831}$	$81\overline{)7538}$	$61\overline{)2014}$
4.	$61\overline{)981}$	$51\overline{)3724}$	$71\overline{)1667}$	$51\overline{)3724}$
5.	$11\overline{)686}$	$61\overline{)1946}$	$41\overline{)8738}$	$41\overline{)9762}$
6.	$91\overline{)913}$	$71\overline{)2987}$	$61\overline{)1773}$	$31\overline{)6299}$
7.	$31\overline{)836}$	$71\overline{)45000}$	$61\overline{)20143}$	$31\overline{)2604}$
8.	$61\overline{)747}$	$41\overline{)37629}$	$51\overline{)38246}$	$71\overline{)5538}$

A Magic Square

If the numbers from 1 to 25 are placed in a magic square, as shown at the right, the sum of the numbers in each row, or in each column, or in each of the two diagonals is always the same.

11	18	25	2	9
10	12	19	21	3
4	6	13	20	22
23	5	7	14	16
17	24	1	8	15

1. Add each row, column, and diagonal to show the sums are the same.

Divisors Ending in 2

1. A merchant paid \$24 for 32 pairs of roller skates. What was the cost per pair?

$$\begin{array}{r} \$.75 \\ 32\overline{)\$24.00} \\ 22\,4 \\ \hline 1\,60 \\ 1\,60 \\ \hline \end{array}$$

$32\overline{)2400.}$ Think $24 \div 3 = 8$.
Multiply: $8 \times 32 = 256$. Since 256 is more than 240, the estimated quotient figure is too large. The difference of 16 is less than 32, so the estimated quotient figure is $8 - 1$, or 7.
Multiply: $7 \times 32 = 224$. Subtract: $240 - 224 = 16$.
Write 7 in the quotient in tens' place.
Compare: The remainder, 16, is less than the divisor, 32. Bring down 0. The partial dividend is 160.
$32\overline{)160.}$ Think $16 \div 3 = 5r1$.
Multiply: $5 \times 32 = 160$. Write 5 in the quotient. Point off two places in the quotient and place a decimal point. The skates cost 75 cents a pair.

When the second figure in the divisor is 2, use the first figure in the divisor to estimate the quotient figures.

2. Mr. Wilson owns a dairy farm. In one year he received \$1428 for milk and cream. How much did he receive on an average per month?

3. A neighbor sold him 12 acres of land for \$2100. What was the price per acre?

4. Mr. Wilson needed 9 men to help him build a silo. He paid them \$540.00 for 12 days' work. How much did he pay them for 1 day's work?

5. The year's expenses on Mr. Wilson's truck for gas, oil, and repairs amounted to \$166.32. Find the average amount of expenses per month.

Facts and Figures

1. Ribbon Falls is 1612 ft. high. Niagara Falls is 167 ft. high. How much higher is Ribbon Falls?

2. Mt. Everest is 29,141 ft. high. The deepest place in the ocean, near the Philippine Islands, is 35,400 feet. How much above the bottom of the sea is the top of Mt. Everest?

3. In 1938 Howard Hughes flew around the world in an airplane, completing the trip in 3 days and 19 hours. How many hours did the trip take?

4. On his round-the-world flight Howard Hughes flew his plane 14,824 miles. What was his average speed per hour? (See problem 3.)

5. The geyser, Old Faithful, pours out about 1,500,000 gallons of water each time it spouts, about once every hour. How many gallons does Old Faithful spout in one day?

6. In 1883, when the island of Krakatoa exploded, the noise was heard more than 1400 miles away. Sound travels about 1 mile in 5 seconds. How many seconds did it take the sound to travel this distance?

7. The University of Mexico was founded in 1553. Harvard University was founded in 1636. How many years earlier was the University of Mexico founded?

8. The world's heat record is 136° in the shade, established in north Africa in 1922. The cold record is 97° below zero, established in Siberia in 1926. Find the difference in temperature.

Zeros in the Quotient

1. A boy sold 1470 papers in 21 days. What was the average number of papers he sold per day?

$$\begin{array}{r} 70 \\ 21\overline{)1470} \\ \underline{147} \\ 0 \end{array}$$

$21\overline{)147}$. Think $14 \div 2 = 7$.
Multiply: $7 \times 21 = 147$. Subtract: $147 - 147 = 0$. Write 7 in the quotient in tens' place. Bring down 0. Think $0 \div 21 = 0$. Write 0 in the quotient in ones' place. He sold an average of 70 papers a day.

Each time a figure is brought down from the dividend, a figure must be written in the quotient.

2. Divide 18,729 by 61.

$$\begin{array}{r} 307r2 \\ 61\overline{)18729} \\ \underline{183} \\ 429 \\ \underline{427} \\ 2 \end{array}$$

$61\overline{)187}$. 187 is called a partial dividend because it is the part of the dividend that is used to find the first quotient figure.
Think $18 \div 6 = 3$. Multiply: $3 \times 61 = 183$.
Subtract: $187 - 183 = 4$. Compare: 4 and 61. Write 3 in the quotient in hundreds' place. Bring down 2. 42 is less than 61. Write 0 in the quotient in tens' place. Bring down 9.
$61\overline{)429}$. 429 is called the partial dividend because it is the part of the dividend that is used to find the third quotient figure. Think $42 \div 6 = 7$. Multiply: $7 \times 61 = 427$. Subtract: $429 - 427 = 2$. Write 7 in the quotient in ones' place. Write $r2$ after 7.

Divide the following. Prove your answers.

3.	$81\overline{)5427}$	$31\overline{)3331}$	$51\overline{)5463}$	$71\overline{)29876}$
4.	$81\overline{)5696}$	$91\overline{)6397}$	$81\overline{)8798}$	$61\overline{)18467}$
5.	$91\overline{)63941}$	$41\overline{)8438}$	$12\overline{)4846}$	$21\overline{)12821}$

Unit 10. More Two-Figure Divisors

Divisors Ending in 2 or 0

1. In 42 days a bakery sold 14,280 loaves of bread. What was the average number of loaves sold per day?

$42\overline{)142}$. Think $14 \div 4 = 3r2$.
Multiply: $3 \times 42 = 126$. Subtract: $142 - 126 = 16$.
Write 3 in the quotient. Bring down 8.
$42\overline{)168}$. Think $16 \div 4 = 4$.
Multiply: $4 \times 42 = 168$. Subtract: $168 - 168 = 0$.
Write 4 in the quotient. Bring down 0.
Write 0 in the quotient. The bakery sold an average of 340 loaves a day.

$$\begin{array}{r} 340 \\ 42\overline{)14280} \\ \underline{126} \\ 168 \\ \underline{168} \\ 0 \end{array}$$

Proof: $42 \times 340 = 14280$. This product is the same as the dividend. The answer is correct.

2. Walter worked 100 examples in 20 minutes. What was the average number of examples he worked per minute?

$$\begin{array}{r} 5 \\ 2\text{Ø}\overline{)10\text{Ø}} \end{array}$$

To divide 100 by 20, cancel the final 0 in each number. Then divide 10 by 2.

Divide the examples below. Prove the answers.

3.	$60\overline{)1260}$	$22\overline{)5940}$	$32\overline{)30421}$	$50\overline{)40990}$
4.	$12\overline{)4482}$	$20\overline{)7360}$	$12\overline{)10680}$	$42\overline{)39102}$
5.	$50\overline{)6596}$	$12\overline{)8811}$	$32\overline{)26912}$	$22\overline{)20696}$
6.	$40\overline{)8400}$	$12\overline{)9021}$	$42\overline{)16674}$	$40\overline{)32809}$
7.	$22\overline{)7739}$	$50\overline{)1830}$	$32\overline{)27872}$	$42\overline{)24395}$
8.	$92\overline{)8950}$	$52\overline{)4870}$	$70\overline{)60205}$	$82\overline{)64862}$

Exercises in Division

1.	$22\overline{)7739}$	$51\overline{)1836}$	$61\overline{)20137}$	$90\overline{)10970}$
2.	$81\overline{)65985}$	$61\overline{)17735}$	$71\overline{)14672}$	$31\overline{)16128}$
3.	$51\overline{)10216}$	$41\overline{)33224}$	$70\overline{)50230}$	$91\overline{)83050}$
4.	$22\overline{)11108}$	$32\overline{)13975}$	$42\overline{)26796}$	$52\overline{)24725}$
5.	$91\overline{)27386}$	$32\overline{)27872}$	$51\overline{)46000}$	$40\overline{)24360}$

Problem Practice

Always decide the correct operation to use before you try to solve a problem. Solve the problems.

1. The length of one side of a square court is 20 ft. What is the area of the court?

2. At an average speed of 50 miles per hour, how long will it take a train to run 450 miles?

3. How many square feet are there in a floor that is 94 feet long and 74 feet wide?

4. On a trip we drove 158 miles the first day, 298 miles the second, and 86 miles the third. How far did we go?

5. In an assembly room there are 1152 seats in 32 equal rows. How many seats are there in each row?

6. A farmer had 945 sheep and sold all but 248 of them. How many sheep did he sell?

7. Mr. Wilson offered his 52-acre farm for sale for $3900. What was the price per acre?

8. A dealer sold 62 acres of land at $76 per acre. For how much was this land sold?

9. A 32-acre field of corn yielded 1536 bushels. What was the average yield per acre?

Divisors Ending in 8 or 9

1. A 19-acre field of sweet potatoes yielded 1497 bushels. What was the yield per acre?

Since 19 is nearly 20, use 2 in estimating the quotient figures.
19)149. Think $14 \div 2 = 7$.
Multiply: $7 \times 19 = 133$. Subtract: $149 - 133 = 16$.
Write 7 in the quotient. Bring down 7.
19)167. Think $16 \div 2 = 8$.
Multiply: $8 \times 19 = 152$. Subtract: $167 - 152 = 15$.
Write 8 in the quotient. Write $r15$ in the quotient.

```
   78r15
19)1497
   133
   167
   152
    15
```

2. Divide 3329 by 38.

Since 38 is nearly 40, use 4 in estimating the quotient figures.
38)332. Think $33 \div 4 = 8r1$.
Multiply: $8 \times 38 = 304$. Subtract: $332 - 304 = 28$.
Write 8 in the quotient. Bring down 9.
38)289. Think $28 \div 4 = 7$. $7 \times 38 = 266$.
$289 - 266 = 23$. Write 7 followed by $r23$.

```
   87r23
38)3329
   304
   289
   266
    23
```

When the second figure in the divisor is 8 or 9, increase the first number in the divisor by 1 and use it to estimate the quotient figures.

Divide the numbers below. Prove the answers.

3.	19)84	29)224	39)271	49)315	28)188
4.	38)756	89)522	49)876	59)438	68)252
5.	59)230	39)346	88)732	39)297	79)532
6.	69)645	58)187	68)423	78)356	89)572
7.	48)362	79)656	68)352	49)463	19)188

Testing the Quotient Figure

1. A store sold 197 typewriters in 48 days. How many were sold, on the average, per day?

$48\overline{)197}$. Think $19 \div 5 = 3r4$.
Test the quotient figure 3 before you write it in the quotient. Since the difference between 197 and 144 is more than 48, the quotient figure must be 4. Think $4 \times 48 = 192$. Subtract: $197 - 192 = 5$. Write 4r5 in the quotient.

$$\begin{array}{r} 4r5 \\ 48\overline{)197} \\ 192 \\ \hline 5 \end{array}$$

Always multiply the divisor by the estimated quotient figure and compare the product with the dividend before writing the figure in the quotient.

Multiply the following without copying the numbers:

2.	7×18	3×28	4×38	2×48	4×58
3.	6×38	7×58	6×18	5×68	4×28
4.	7×68	4×48	3×78	7×38	6×58
5.	4×78	9×58	4×18	9×68	4×98
6.	5×98	7×28	3×88	9×38	2×88
7.	6×48	9×98	5×48	5×88	8×58
8.	8×78	7×88	9×28	6×78	7×48
9.	8×98	7×78	9×48	9×88	8×28

Divide the following. Prove your answers.

10.	$59\overline{)417}$	$59\overline{)411}$	$89\overline{)537}$	$89\overline{)522}$	$28\overline{)896}$
11.	$28\overline{)117}$	$49\overline{)396}$	$58\overline{)527}$	$62\overline{)492}$	$52\overline{)314}$
12.	$88\overline{)621}$	$82\overline{)249}$	$42\overline{)376}$	$72\overline{)579}$	$78\overline{)713}$

Mixed Practice

Add and check:

1.

1	5	8	4	7	4	4	8	1
9	7	2	5	5	6	5	8	3
7	1	9	9	6	2	9	7	8
8	1	2	9	8	9	7	9	5
2	2	8	6	2	4	6	9	8

2.

$7.85	$6.40	$4.75	$15.50	$48.30
6.54	2.90	9.87	25.40	79.86
.72	3.65	12.62	5.81	36.99
12.64	4.76	.95	19.40	6.37
1.78	1.45	1.47	12.65	48.75
2.46	2.50	8.40	2.80	24.68

Find the answers. Watch the signs.

3.

2046	4000	3076	5673	8111
−1938	−3467	−1429	−3578	−7889

4.

$50.75	$10.00	$18.39	$49.67	$8.13
−12.80	−8.93	−7.85	−28.89	−7.28

5.

412	309	826	250	703	784
×87	×95	×407	×250	×398	×69

6.

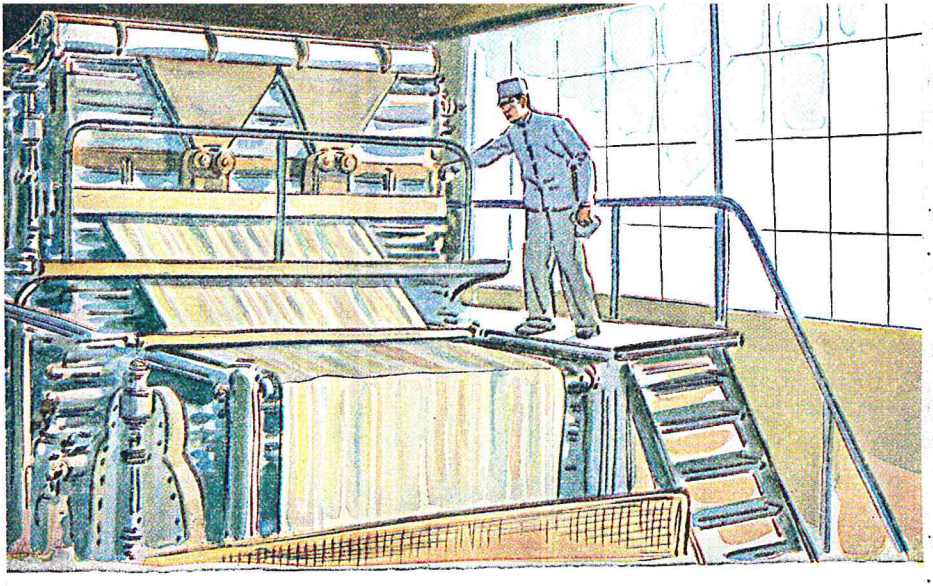
$1.85	$2.30	$2.96	$7.86	$478
×17	×27	×35	×356	×706

7. $29\overline{)231}$ $28\overline{)245}$ $29\overline{)238}$ $39\overline{)197}$ $39\overline{)192}$

8. $79\overline{)312}$ $79\overline{)319}$ $89\overline{)538}$ $89\overline{)532}$ $48\overline{)951}$

9. $68\overline{)404}$ $68\overline{)412}$ $49\overline{)341}$ $49\overline{)348}$ $49\overline{)2894}$

10. $78\overline{)3980}$ $92\overline{)1824}$ $59\overline{)6870}$ $38\overline{)8740}$ $48\overline{)4201}$



A Large Newspaper

1. One of the large newspapers of the United States has a daily circulation of about 1,076,000 and a Sunday circulation of about 1,140,000. How much larger is its Sunday circulation?

2. The circulation for 6 days was 6,493,332. What was the average daily circulation during this week?

3. A high-speed press can print 60,000 papers an hour. If one press were running constantly, how many hours would it take to print 1,080,000 papers?

4. The company has 60 high-speed presses, each of which prints about 48,000 papers per hour. If these 60 presses were running constantly, how many papers could they print in one hour? in 8 hours?

5. The newspapers are delivered to all parts of the city by 72 trucks. One day these trucks carried 565,200 papers. What was the average number of papers carried per truck?

Unit 11. Two-Step Problems

Follow this plan in solving two-step problems.

First: Find the facts that are given.
Second: Find the question that is asked.
Third: Decide the 2 operations that must be used.
Fourth: Decide which operation must be used first.
Fifth: Take time to work each step correctly.

1. Arthur bought a glove for \$2.89 and a ball for 85¢. What was his change from \$5.00?

You must know how much Arthur spent before you can find how much he had left. Since he bought a glove and a ball, you must find the cost of these 2 items. To do this, you must add the prices paid for these items. This is step 1.

A

Step 1
\$2.89
+.85
\$3.74

You learned that Arthur had \$5.00 before he bought a glove and ball. You found that he paid \$3.74 for the glove and ball. To find how much he had left, you must subtract the amount he spent from the amount he had before he made his purchases. This is step 2.

S

Step 2
\$5.00
−3.74
\$1.26

2. Margaret read 47 pages Monday and 79 Tuesday. How many more pages are there in a book of 278 pp.?

3. On June 1 Mr. Allen's bank balance was \$175.34. During June he deposited \$335.75 and drew out \$289.48. What was his bank balance at the end of the month?

Two-Step Problems

1. Mr. Allen bought 3 chairs at $5.95 a chair. What was his change from $20.00?

Step 1. Multiply the price of 1 chair by 3 to find the price of 3 chairs.

Step 2. Subtract the amount he spent from the amount he had.

Step 1	Step 2
$ 5.95	$20.00
×3	−17.85
$17.85	$ 2.15

Mr. Allen got $2.15 in change.

2. Mr. Brown bought 5 city lots at $500 each. He sold them later for $2750. What did he make on the lots?

3. Mr. Davis paid $1200 for 4 lots. He sold them later for $400 each. How much did he make on the lots?

Practice for Accuracy

1.	78)622	59)324	88)714	31)216	78)648
2.	48)416	68)544	39)195	41)317	62)485
3.	92)558	71)564	82)574	78)702	92)629
4.	82)794	58)524	38)328	98)865	72)500
5.	32)2964	42)3285	78)6390	68)3052	
6.	69)1140	58)2037	99)1089	49)3755	
7.	72)4533	88)7453	92)9728	52)1095	
8.	79)1860	82)1614	98)8750	49)5001	

Problems to Solve

Think through the problem. When you have decided how to solve it, take time to get the correct answer.

1. Mr. Brown paid \$1.45 for each of 3 shirts and \$4.95 for a hat. How much did he spend?

\$1.45
×3
4.35
+4.95
\$9.30

Step 1. Multiply the price of 1 shirt by 3 to find the price of 3 shirts.

Step 2. Add the price of the hat and the price of the shirts to find the amount spent.

2. Walter had \$6.25. Then he worked 7 hours for 35¢ an hour. How much money did he have then?

3. Arthur had \$16.25. After paying \$4.45 for a jacket and \$3.96 for shoes, how much did he have left?

4. Two girls sold 96 glasses of lemonade at 5¢ each. The lemons and sugar cost \$1.65. What was the profit?

5. Susan bought 3 dozen eggs at 39¢ a dozen and a dozen oranges for 55¢. What was the cost?

6. Martha gave the clerk \$2 to pay for 4 pounds of butter at 36¢ a pound. What was her change?

7. A dealer bought a lot for \$650 and built a house on it for \$4250. He sold the property for \$6300. What was his profit?

8. Howard's brother earned \$5.75 a week for 6 weeks and spent \$18.75 for a suit. How much did he have left?

9. What is the cost of 14 gallons of gas at 19¢ a gallon and a quart of oil at 25¢?

10. On a trip of 927 miles, Mr. Allen drove 468 miles the first day and 379 miles the second day. How much farther did he have to go?

Sight Problems

1. Harold bought four 5-cent post cards. What was his change from 50¢?

2. Joyce bought 4 cans of corn at 11¢ a can and a bar of soap for 7¢. Find the cost.

3. A grocer paid $2 for 10 pecks of potatoes and sold them at 30¢ a peck. How much did he make?

4. In going 180 miles, a car used 10 gallons of gasoline. How many miles per gallon did it go?

5. Henry had 30¢, and his father gave him a half dollar. How much more does he need to buy a football costing $1.45?

6. After working 8 hours for 20¢ an hour, Ed bought a baseball glove for $1.50. How much did he have left?

Practice in Division

1.	$4\overline{)3142}$	$6\overline{)6942}$	$8\overline{)9181}$	$7\overline{)7342}$	$9\overline{)3821}$
2.	$9\overline{)4951}$	$8\overline{)1973}$	$4\overline{)9270}$	$9\overline{)4046}$	$7\overline{)6384}$
3.	$6\overline{)7384}$	$7\overline{)5886}$	$5\overline{)9270}$	$6\overline{)7921}$	$8\overline{)7684}$
4.	$3\overline{)4124}$	$6\overline{)6322}$	$9\overline{)4181}$	$8\overline{)5483}$	$7\overline{)6900}$
5.	$3\overline{)4834}$	$4\overline{)2632}$	$6\overline{)1041}$	$9\overline{)3012}$	$8\overline{)8590}$
6.	$7\overline{)5441}$	$3\overline{)2632}$	$6\overline{)8873}$	$4\overline{)1842}$	$6\overline{)5703}$
7.	$32\overline{)197}$	$48\overline{)349}$	$61\overline{)551}$	$52\overline{)315}$	$38\overline{)376}$
8.	$68\overline{)280}$	$58\overline{)350}$	$62\overline{)424}$	$51\overline{)542}$	$28\overline{)267}$
9.	$72\overline{)283}$	$38\overline{)158}$	$42\overline{)329}$	$69\overline{)496}$	$98\overline{)857}$

Harold's Cash Account

Harold pays for many of the things he buys from the $1.00 allowance which he receives from his father each week and from the additional money he earns.

1. On September 1 Harold's cash on hand was $9.25. Then he received $3.46 and paid out $1.15. What was his cash on hand?

Cash Received				Cash Paid Out			
Oct.				Oct.			
1	Cash on hand	$14	22	2	Rubbers	$1	00
4	Allowance	1	00	4	Football game		50
11	Allowance	1	00	6	Bicycle repaired		85
11	Washing car		75	13	Haircut		25
14	Sold old papers		79	14	Cap	1	00
18	Allowance	1	00	20	Shoes repaired		95
18	Washing windows		50	23	Bicycle bell		35
25	Allowance	1	00	24	Book		25
31	Errand		40		Total		
	Total				Cash on hand		

2. Find the cash received for October.

3. Find the cash paid out for October.

4. Find the cash on hand for October 31.

5. On January 1 Harold had $8.36. He has since received $114.30 and paid out $106.20. Find his cash on hand.

Two-Step Problems

Decide which operations to use. Then solve the problems.

1. I bought a radio for $130. I paid $60 cash and agreed to pay the balance at the rate of $5 a month. How long will it take to pay the balance?

Step 1. Subtract the cash payment from the price to see how much is still due.

Step 2. Divide the amount due by the monthly payment to find the number of payments.

$$\begin{array}{r} 130 \\ -60 \\ \hline 5\overline{)70} \\ 14 \end{array}$$

2. I have $17.50. How much more do I need to buy a $25 suit and an $18 overcoat?

3. How many hours will it take a train to go 624 miles at the rate of 48 miles per hour?

4. A man started on a trip of 820 miles. If he drove at a speed of 45 miles per hour for 9 hours, how far did he still have to go?

5. A grocer paid $5.50 for 5 bushels of potatoes. If he sold them at $1.50 a bushel, what did he gain?

6. Tom bought a bicycle for $28. He paid $7. How long will it take him to pay the balance at $3 a month?

7. A carpenter was paid $85 for building a garage. He paid $32.50 for material and $28.75 for help. How much did he get for his own work?

8. A baseball team raised $100. How much more money will they need to buy 9 uniforms at $12 each?

9. What change should you receive from a $5 bill if you buy a hat for $1.75 and a pair of gloves for $2.25?

Unit 12. The Remaining Two-Figure Divisors

Divisors Ending in 3 or 7

1. In 33 days Ed delivered 2846 papers. What was his average daily delivery?

Divide 2846 by 33. $9 \times 33 = 297$. This is larger than 284, and so you must use 8 for the first quotient figure. Tell why 6 is correct for the second quotient figure. The answer is 86 papers and 8 over.

```
   86r8
33)2846
   264
   206
   198
     8
```

2. Divide 3907 by 57.

Since 57 is nearly 60, you may use $6\overline{)39}$ to estimate the first quotient figure. For the second quotient figure, use $6\overline{)48}$. Tell why 6 and 8 are the correct quotient figures.

```
   68r31
57)3907
   342
   487
   456
    31
```

Divide the following. Prove the answers.

3.	$33\overline{)65}$	$33\overline{)130}$	$33\overline{)145}$	$33\overline{)162}$	$33\overline{)187}$
4.	$33\overline{)68}$	$33\overline{)211}$	$33\overline{)228}$	$33\overline{)256}$	$33\overline{)275}$
5.	$33\overline{)70}$	$33\overline{)294}$	$33\overline{)298}$	$33\overline{)315}$	$33\overline{)328}$
6.	$33\overline{)282}$	$33\overline{)196}$	$33\overline{)110}$	$33\overline{)115}$	$37\overline{)145}$
7.	$37\overline{)149}$	$37\overline{)169}$	$37\overline{)180}$	$37\overline{)188}$	$37\overline{)218}$
8.	$37\overline{)264}$	$37\overline{)298}$	$37\overline{)330}$	$37\overline{)336}$	$37\overline{)368}$
9.	$43\overline{)395}$	$77\overline{)486}$	$57\overline{)462}$	$83\overline{)418}$	$67\overline{)540}$
10.	$97\overline{)843}$	$73\overline{)660}$	$73\overline{)745}$	$47\overline{)264}$	$73\overline{)462}$

Practice in Division

1.	$2\overline{)181}$	$3\overline{)237}$	$4\overline{)300}$	$5\overline{)352}$	$7\overline{)902}$
2.	$3\overline{)331}$	$5\overline{)217}$	$6\overline{)541}$	$4\overline{)203}$	$6\overline{)746}$
3.	$5\overline{)9450}$	$7\overline{)3927}$	$3\overline{)1495}$		$8\overline{)5001}$
4.	$6\overline{)3606}$	$4\overline{)7000}$	$6\overline{)2300}$		$7\overline{)6111}$
5.	$57\overline{)1254}$	$39\overline{)1476}$	$78\overline{)1824}$		$48\overline{)1488}$
6.	$42\overline{)3024}$	$42\overline{)3444}$	$57\overline{)6992}$		$53\overline{)4452}$
7.	$41\overline{)8568}$	$67\overline{)8241}$	$32\overline{)7543}$		$43\overline{)9163}$
8.	$42\overline{)1764}$	$67\overline{)1408}$	$31\overline{)2263}$		$53\overline{)1696}$
9.	$83\overline{)5810}$	$77\overline{)4268}$	$63\overline{)6010}$		$47\overline{)4510}$

Problems

1. In a large school there are 748 pupils in 22 rooms. What is the average number per room?

2. Jerry spent 40¢ for meat and the rest of a dollar for oranges at 5¢ each. How many oranges did he buy?

3. Mr. Jones raised 3876 bushels of corn on a 68-acre field. What was the average yield per acre?

4. Mr. Bond borrowed $550 and later $425. He has paid back $795. How much does he still owe?

5. At $78 per acre, how much money will it take to pay for a 160-acre farm?

6. Ed has saved $2.25. How much more does he need to buy a $5 football?

7. Four boys earned $3.20 in all. What did each earn?

Divisors Ending in 4, 5, or 6

1. Study each step in the examples below:

$$\begin{array}{r} 88r10 \\ 14\overline{)1242} \\ 112 \\ \hline 122 \\ 112 \\ \hline 10 \end{array} \qquad \begin{array}{r} 73r22 \\ 25\overline{)1847} \\ 175 \\ \hline 97 \\ 75 \\ \hline 22 \end{array} \qquad \begin{array}{r} 57r29 \\ 76\overline{)4361} \\ 380 \\ \hline 561 \\ 532 \\ \hline 29 \end{array}$$

Divide the following. Prove your answers.

2.	$15\overline{)143}$	$54\overline{)458}$	$66\overline{)579}$	$64\overline{)294}$	$76\overline{)694}$
3.	$74\overline{)438}$	$75\overline{)438}$	$84\overline{)496}$	$95\overline{)827}$	$95\overline{)763}$
4.	$85\overline{)590}$	$96\overline{)896}$	$24\overline{)197}$	$16\overline{)152}$	$14\overline{)132}$
5.	$15\overline{)154}$	$24\overline{)527}$	$35\overline{)837}$	$15\overline{)784}$	$26\overline{)981}$
6.	$34\overline{)779}$	$26\overline{)806}$	$36\overline{)893}$	$44\overline{)978}$	$46\overline{)912}$
7.	$45\overline{)982}$	$54\overline{)831}$	$56\overline{)984}$	$55\overline{)478}$	$66\overline{)318}$
8.	$64\overline{)479}$	$65\overline{)518}$	$74\overline{)985}$	$76\overline{)638}$	$75\overline{)900}$
9.	$86\overline{)724}$	$94\overline{)648}$	$76\overline{)772}$	$64\overline{)546}$	$96\overline{)728}$

Sight Problems

1. If I buy 3 cans of milk at 8¢ a can, what is my change from $1.00?

2. Ed had 10¢ and earned 15¢. How much more does he need to buy a 35¢ ball?

3. Two girls sold 20 glasses of lemonade at 5¢ a glass. Their expenses were 60¢. What was their profit?

4. Joyce paid 15¢ a yard for 3 yards of ribbon and 5¢ for a spool of thread. What did she spend?

Practice in Solving Problems

1. At 7 pounds for 25¢, how many pounds of apples can I buy for 50¢?

Step 1. Divide to find how many times 25 is contained in 50.

Step 2. Multiply the quotient in step 1 by 7 to find the number of pounds.

$$\begin{array}{r} 25\overline{)50} \\ 2 \\ \times 7 \\ \hline 14 \end{array}$$

2. Mr. Davis drove his car 696 miles in 3 days. What was the average distance per day?

3. Mr. Harrison drove at an average speed of 32 miles per hour for 4 hours. What distance did he drive?

4. What is the cost of 3 auto tires at $6 each and a battery at $8?

5. At 3 for 10¢, what will 6 lemons cost?

Practice for Accuracy

1.	$54\overline{)4428}$	$44\overline{)1716}$	$49\overline{)2256}$	$84\overline{)4104}$
2.	$86\overline{)2495}$	$36\overline{)1620}$	$74\overline{)6586}$	$76\overline{)6386}$
3.	$46\overline{)3358}$	$76\overline{)5599}$	$26\overline{)1264}$	$45\overline{)4275}$
4.	$64\overline{)6390}$	$84\overline{)8232}$	$55\overline{)5450}$	$94\overline{)9376}$
5.	$92\overline{)9110}$	$54\overline{)4951}$	$66\overline{)6530}$	$85\overline{)8049}$
6.	$84\overline{)8130}$	$60\overline{)4925}$	$74\overline{)5114}$	$93\overline{)4777}$
7.	$86\overline{)7742}$	$67\overline{)4689}$	$69\overline{)6690}$	$84\overline{)8242}$
8.	$96\overline{)9792}$	$55\overline{)4957}$	$89\overline{)8019}$	$85\overline{)6980}$
9.	$56\overline{)3497}$	$54\overline{)4139}$	$65\overline{)5001}$	$36\overline{)3314}$

Practice in Division

1.	47)9637	73)5987	46)1853	57)5298
2.	57)3990	67)4154	85)2937	54)4489
3.	47)1598	66)3564	74)6889	96)4032
4.	52)1518	45)2263	57)4648	37)1864
5.	86)2774	59)4097	14)3346	96)3552
6.	69)2456	68)6673	76)5840	46)5635
7.	54)3402	73)3358	97)4186	39)1989

Problems

1. If an automobile goes 336 miles on 24 gallons of gasoline, what is the average number of miles per gallon?

2. A farmer raised 1422 bushels of wheat on 79 acres of land. What was the average number of bushels per acre?

3. A bushel of shelled corn weighs 56 pounds. How many bushels are there in 4760 pounds of corn?

4. If an automobile averages 28 miles per hour, how long will it take to drive 1008 miles?

5. What is the cost of a dozen eggs at 30¢ a dozen and a pound of steak at 40¢?

6. Twenty-one boys went to a boy-scout camp. The total cost of the trip was $483. What was each boy's share of the expenses?

7. Mrs. Wilson bought 6 chairs at $8.00 each and paid $18 cash. How much did she still owe on the chairs?

8. A freight train ran 198 miles in 9 hours. What was its average speed?

Measures of Length

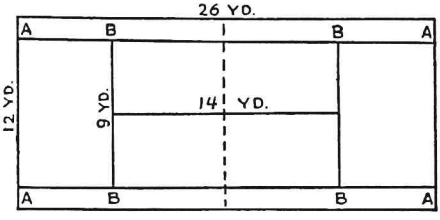
12 inches (in.) = 1 foot (ft.)
3 feet = 1 yard (yd.)
$16\frac{1}{2}$ feet = 1 rod (rd.)
$5\frac{1}{2}$ yards = 1 rod
320 rods = 1 mile (mi.)
5280 feet = 1 mile

1. How many miles long and wide is your state?

2. How far is it from your home to New York City?

3. A tennis court measures 26 yd. by 12 yd. What is its perimeter?

4. How many yards is it from *A* to *B* on the court?



5. A garden is 75 feet wide and 120 feet long. What is its width and length in yards?

6. A cattle ranch is 8 miles long and 3 miles wide. How many miles of fencing are needed for the ranch?

Find the missing numbers in the following lines:

7. 2 ft. = ___ in. $1\frac{1}{2}$ ft. = ___ in. $3\frac{1}{2}$ ft. = ___ in.

8. 4 yd. = ___ ft. 2 rd. = ___ yd. 4 rd. = ___ ft.

9. 3 mi. = ___ rd. 2 mi. = ___ ft. $\frac{1}{2}$ mi. = ___ rd.

10. $\frac{1}{4}$ mi. = ___ rd. $\frac{3}{4}$ mi. = ___ rd. $1\frac{1}{2}$ mi. = ___ rd.

11. $5\frac{1}{2}$ yd. = ___ ft. 33 ft. = ___ yd. 66 ft. = ___ rd.

12. 1 ft. 9 in. = ___ in. 4 yd. 2 ft. = ___ ft.

13. 1 mi. 40 rd. = ___ rd. 3 mi. 105 rd. = ___ rd.

14. 17 in. = ___ ft. ___ in. 10 ft. = ___ yd. ___ ft.

Third Self-Test

Testing Your Accuracy

Find the answers. Watch the signs.

1.

597	929	549	934	679	956
845	868	445	657	778	565
466	493	367	719	849	667
658	924	425	794	539	892
560	732	368	879	942	693
516	748	549	986	679	767

2.

8346	7494	4056	6050	3135	8333
−5308	−5785	−2789	−4659	−1267	−1996

3.

6303	8351	9970	8852	7681	8461
−1348	−3407	−5945	−6778	−2702	−4906

4.

4901	9578	6412	7065	8243	3268
−1340	−5669	−2543	−4078	−3137	−1759

5.

583	286	926	894	647	957
×63	×95	×72	×54	×83	×490

6.

765	519	608	849	286	970
×503	×64	×720	×65	×94	×83

7.

915	274	867	342	196	387
×85	×32	×16	×78	×49	×57

8. $9\overline{)6005}$ $7\overline{)5107}$ $6\overline{)4781}$ $8\overline{)6305}$

9. $22\overline{)3570}$ $46\overline{)2562}$ $91\overline{)4468}$ $67\overline{)8701}$

10. $54\overline{)6500}$ $78\overline{)8057}$ $83\overline{)8307}$ $69\overline{)4070}$

Problem Test

1. Louis makes a profit of 2¢ on each paper he sells. How many papers must he sell to make 90¢?

2. Mr. Davis drove his car 180 miles in 4 hours. What was his average speed per hour?

3. Lucy bought fruit for 30¢, bread for 20¢, and milk for 14¢. What was her change from $1?

4. On Saturday Mildred practiced her music lesson from 2:45 P.M. to 3:15 P.M. How long did she practice?

5. What is the cost of 2 boxes of berries at 15¢ a box and a dozen bananas at 55¢?

6. Jerry set 48 tomato plants in 6 equal rows. How many plants did he set in each row?

7. At 60¢ a dozen, what do 6 dozen oranges cost?

8. I bought 3 pounds of butter at 35¢ a pound. What change should I have received from $5?

9. Harry spent $14.80 in raising potatoes. He sold 74 bu. at 95¢ a bushel. How much did he get for his work?

10. Henry received 25¢ an hour for 4 hours' work. After paying 30¢ for oranges, how much did he have?

11. At an average speed of 40 miles an hour, how long will it take a train to travel 280 miles?

12. Find the cost of 9 lb. of ham at 37¢ a pound and 3 dozen eggs at 29¢ a dozen.

13. At 85¢ per person, how much would dinner for 7 persons cost, including a 75¢ tip?

14. At 20¢ an hour, how much can Jim earn in 7 hours?

Unit 13. Practice in Division

Exercises in Division

1.	$21\overline{)119}$	$31\overline{)152}$	$22\overline{)137}$	$32\overline{)192}$	$32\overline{)232}$
2.	$32\overline{)259}$	$21\overline{)149}$	$22\overline{)199}$	$23\overline{)116}$	$54\overline{)163}$
3.	$65\overline{)221}$	$45\overline{)236}$	$61\overline{)149}$	$52\overline{)107}$	$42\overline{)312}$
4.	$42\overline{)187}$	$52\overline{)386}$	$52\overline{)218}$	$62\overline{)448}$	$63\overline{)327}$
5.	$39\overline{)226}$	$28\overline{)289}$	$38\overline{)317}$	$54\overline{)496}$	$74\overline{)614}$
6.	$86\overline{)357}$	$89\overline{)657}$	$84\overline{)529}$	$76\overline{)586}$	$75\overline{)436}$
7.	$32\overline{)1984}$	$22\overline{)1386}$	$52\overline{)4940}$	$91\overline{)38157}$	
8.	$81\overline{)3895}$	$72\overline{)3754}$	$81\overline{)2673}$	$46\overline{)18538}$	
9.	$52\overline{)2132}$	$45\overline{)1980}$	$32\overline{)2644}$	$37\overline{)20141}$	
10.	$92\overline{)7452}$	$62\overline{)3472}$	$82\overline{)5330}$	$62\overline{)36183}$	

Problems

1. From a 45-acre field a farmer harvested 765 bushels of wheat. Find the average yield per acre.

2. In 14 weeks during the summer Jim earned $51.10. How much did he average per week?

3. How many square feet are there in a basement floor 36 ft. wide and 48 ft. long?

4. How many feet of fencing will be needed to fence a lot 60 ft. wide and 120 ft. long?

Mixed Practice

Add the columns below. Check your answers.

1.

548	945	487	789	765	637
934	634	795	554	654	543
854	654	274	869	632	689
687	478	385	738	798	276
937	967	793	486	467	832
208	979	654	275	686	974

Find the answers. Watch the signs.

2.

6000	7500	7430	8005	8070	9400
−2538	−2946	−4695	−1796	−3456	−8695

3.

8368	7282	9652	8896	7945	9586
−2054	−3957	−2323	−7244	−3177	−3088

4. $93\overline{)5803}$ $34\overline{)3872}$ $66\overline{)2112}$ $55\overline{)5451}$

5. $35\overline{)7532}$ $46\overline{)9558}$ $44\overline{)9056}$ $63\overline{)1274}$

6. $36\overline{)7090}$ $85\overline{)7500}$ $74\overline{)9003}$ $18\overline{)7130}$

7.

703	650	864	875	948	859
×27	×64	×320	×64	×64	×764

8.

978	775	983	975	785	976
×49	×64	×47	×82	×68	×987

9.

584	862	943	795	987	698
×92	×43	×75	×38	×65	×308

10.

$2.24	$1.16	$2.90	$7.50	$4.98
×12	×52	×50	×84	×295

A Christmas Party

Miss Williams' pupils are having a Christmas party.

1. The committee bought a tree for 50¢, ornaments for 78¢, candy for 55¢, cookies for 45¢, chocolate for 19¢, milk for 65¢, and decorations for 72¢. What was the total cost?

2. The teacher and the 31 children shared the expenses of the party. What was the share of each?

3. The pupils used 210 ft. of paper in making decorations for their room. If each roll contained 10 yd., how many rolls of paper did they use?

4. The pupils planned to make two cups of chocolate for each of the 32 people present. How many quarts of chocolate were needed? (1 quart = 4 cups)

5. The teacher and the 31 children each paid 5¢ for gifts. What was the cost of the gifts?

6. The party began at 2:35 P.M. and will end at 4:15 P.M. How long will it have lasted?

Sight Problems

1. Louis buys magazines at 3¢ each and sells them for 5¢ each. What is his profit on 25 magazines?

2. A room is 15 ft. wide and 21 ft. long. What are the width and length in yards and the area in square yards?

3. How many rods of fencing will be needed to fence a lot 50 rods long and 30 rods wide?

4. How many square feet are there in the area of a pane of glass 12 in. long and 12 in. wide?

5. A dealer bought 3 lots for $200 each and sold all of them for $750. How much did he make?

6. In 4 school weeks, Arthur was absent 2 days. How many days was he in school?

7. Ed paid 50¢ for a knife and spent the rest of a dollar for 5-cent oranges. How many oranges did he buy?

8. Jerry bought 3 ties at 50¢ each. What was his change from $2?

9. Mrs. Davis had $1.50 and bought 5 handkerchiefs at 25¢ each. How much did she have left?

Exercises in Division

1.	6)5673	4)6383	5)1897	8)$37.68
2.	6)5486	8)7269	7)4827	6)$81.00
3.	83)4673	46)3496	43)2614	58)31320
4.	74)5678	36)2829	57)2992	67)47168
5.	36)1224	44)2987	49)3847	54)44820
6.	25)5775	63)6325	91)3852	62)78457

Two-Step Problems

Take time to solve each problem correctly.

1. Three peach trees bore 8 bu., 14 bu., and 11 bu. What was the average yield per tree?

Step 1. Add the amounts the trees bore to find the total yield for the 3 trees.

Step 2. Divide the total yield by the number of trees to find the average yield.

```
 8
14
11
3)33
 11
```

2. Each month Mrs. Brown pays $18 for rent, $20 for board, and $2 for telephone. How much does she pay for these in a year?

Step 1. Add the amounts the items cost to find the total expense for 1 month.

Step 2. Multiply the expense for 1 month by 12 to find the expense for 1 year.

```
 $18
  20
   2
 $40
  12
$480
```

3. A dealer sold 3 cars. He made $124, $95, and $240 on the three cars. What was his average profit?

4. Four boys are going camping. Each boy wants a shirt for $1.35, shoes for $2.98, and a knife for 65¢. Find the cost of these things for the 4 boys.

5. Virginia's mother bought 24 cans of peaches at 23¢ each and a sack of flour for $1.29. Find the cost.

6. A dealer took a used car in trade for $120. He spent $35 for repairs and sold it for $185. Did he gain or lose on the car, and how much?

7. Ed bought a bicycle for $32. He paid $7 and the balance in 5 equal monthly payments. How much was due each month?

8. A room measures 5 yards 2 feet long. How many feet long is the room?

Measures of Time

60 seconds = 1 minute	**52 weeks = 1 yr. (nearly)**
60 minutes = 1 hour	**12 months = 1 year**
24 hours = 1 day	**365 days = 1 common year**
7 days = 1 week	**366 days = 1 leap year**
100 years = 1 century	

Time measures are used every day by millions of people. To help us use these measures, we need clocks, watches, calendars, and timetables.

1. Make a list of the ways in which we use time measures and bring the list to class.

2. Tell ways in which time measures are used in homes, schools, factories, churches, and theaters. How do trains, busses, boats, and airplanes use measures of time?

3. Find out how dates are used in letter writing, in accounts, in bills, in business papers, in newspapers and magazines, and in histories.

4. Find examples of wages or salaries that are paid by the hour, the day, the week, the month, or the year.

5. We get our time measures from the two movements of the earth. The time it takes the earth to make one complete turn on its axis we call a day. The time it takes the earth to revolve around the sun (about 365 da.), we call a year. How many days are there in a common year?

6. Leap year comes every fourth year except in century years that cannot be divided by 400. In leap years February has 29 instead of 28 days. How many days are there in a leap year?

7. Write the names of the 12 months in order and give the number of days in each. One year equals how many weeks?

Unit 14. Square Measure

Problems in Area

144 square inches (sq. in.) = 1 square foot (sq. ft.)
9 square feet = 1 square yard (sq. yd.)
$30\frac{1}{4}$ square yards = 1 square rod (sq. rd.)
160 square rods = 1 acre (A.)
640 acres = 1 square mile (sq. mi.)
1 square mile = 1 section (sec.)

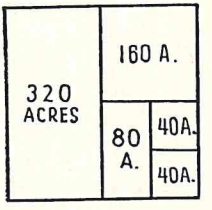
1. Draw a 1-foot square and divide it into 1-inch squares to show that 12×12 sq. in. $= 144$ sq. in.

2. Divide a 1-yard square into 1-foot squares.

3. The square rod, the acre, and the square mile are used in measuring land. A square rod is $16\frac{1}{2}$ ft. square. Measure off a square rod in the school yard.

4. A piece of land containing 160 sq. rd. is an acre. How many square rods are there in a piece of land 20 rods by 8 rods?

5. A section, or square mile, contains 640 acres. How many sections are there in a tract of land 4 miles long and 3 miles wide? how many acres?



6. How many acres are there in a half section of land?

7. Find the length and the width in rods for each of the five pieces of land shown in the drawing above.

8. How many acres are there in 6 sections of land?

9. What is the area of your own state? of the United States? of Alaska? of Yellowstone Park?

Two-Step Problems

Take time to solve each problem correctly.

1. A cow averaged 14 qt. of milk a day for the month of June. At 8¢ per quart, what was the value of this milk?

Step 1. Multiply the number of quarts per day by the number of days. (June has 30 days.)

Step 2. Multiply the total number of quarts of milk produced by the price per quart.

$$\begin{array}{r} 14 \\ \times 30 \\ \hline 420 \\ \times .08 \\ \hline \$33.60 \end{array}$$

2. Howard picked 12 qt. of strawberries and 9 qt. of blackberries. He sold them all at 14¢ a quart. How much did he receive for them?

3. A dealer bought 24 cans of coffee for $4.50 and sold them at 28¢ a can. Find his profit.

4. A grocer bought 56 pecks of potatoes at 18¢ a peck and sold them at 29¢ a peck. What was his profit?

Practice in Addition

1.

78	13	46	64	15	67	92	84
89	57	28	75	26	45	63	97
32	92	94	86	49	89	78	59
45	46	34	97	37	67	46	36
56	80	88	13	58	41	54	67
67	30	99	48	84	38	73	43

2.

$9.15	$27.46	$.17	$120.40	$1.16
.85	35.25	8.65	3.42	.76
7.30	51.34	.64	26.95	6.08
12.60	4.60	.09	.78	.69
3.58	.65	3.87	259.64	4.98

Problems

1. Susan's mother paid \$2.50 to have a telephone put in their home. She paid \$2.25 a month for the use of the telephone. Find the total cost for the year.

2. In our schoolroom there are 7 rows of desks with 6 desks in each row. Today all but 8 desks are used. How many children are present?

3. Find the cost of building 48 miles of paved road at \$7250 per mile.

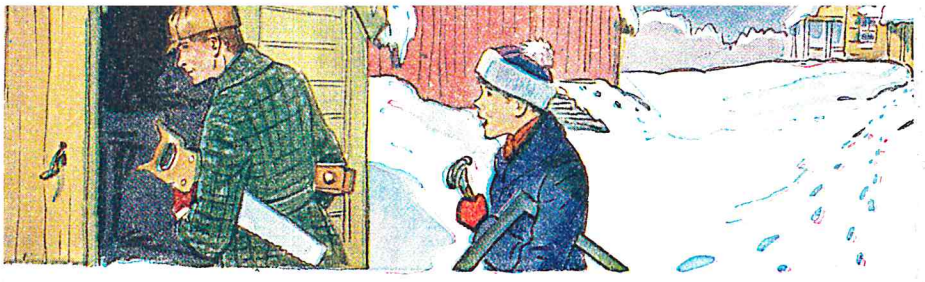
4. Jerry bought a bicycle for \$34. He paid \$7 cash and the balance at \$3 per month. How long did it take him to pay for the bicycle?

\$34 − \$7 = \$27, balance
\$27 ÷ 3 = ___?

5. Bob's father bought a tire for \$9.85 and a gallon of oil for 89¢. What was his change from \$20?

Mixed Practice

1.	8042 − 3437	6000 − 5934	1926 − 858	1250 − 795	2053 − 1925
2.	\$12.50 − 2.95	\$5.50 − 3.86	\$20.00 − 17.63	\$82.60 − 27.85	\$9.24 − .86
3.	842 × 67	535 × 480	804 × 78	492 × 500	870 × 630	697 × 806
4.	\$14.80 × 67	\$6.94 × 27	\$9.75 × 480	\$1.15 × 206	\$7.68 × 600
5.	$79\overline{)3358}$	$38\overline{)9747}$	$92\overline{)8004}$	$54\overline{)21308}$
6.	$65\overline{)6604}$	$47\overline{)6915}$	$86\overline{)3748}$	$67\overline{)25837}$



Arithmetic on the Farm

Bob Adams lives with his family on a 160-acre farm.

1. At $2.75 a square yard, how much would it cost to lay a cement floor 12 ft. wide and 15 ft. long in the barn?

2. A part of the wooden floor in the barn needs repairing. At 18¢ a square foot, what would a floor 10 feet wide and 15 feet long cost?

3. Mr. Adams needs a pane of glass 24 inches wide and 36 inches long. At 20¢ a square foot, how much would this glass cost?

4. Mr. Adams planted wheat in a field 120 rd. long and 80 rd. wide. How many acres did he plant in wheat?

Step 1. Multiply length by width to find the area of the field.

Step 2. Divide the area in rods by 160 to find the area in acres.

Mr. Adams planted 60 acres.

Step 1	Step 2
120	60
×80	160)9600
9600	96
	0

5. Mr. Adams' field of corn is 90 rods long and 80 rods wide. How many acres are in corn?

6. His field of oats, 80 rods by 60 rods, produced 1755 bushels. What was the average per acre?

7. The Adams farm is 160 rods square. What is its value at $125 an acre?

Sight Problems

Write only the answers.

1. Esther saves 5¢ a week. In how many weeks will she save 65¢?

2. At 20¢ a quart, what is the cost of 3 gallons of oil?

3. At 2 for 5¢, what will be the cost of eight oranges?

4. Bob bought 3 large marbles for 5¢ each and then sold them for 20¢. What was his gain?

5. Walter bought 2 tennis balls at 35¢ each. After using them a while, he sold them both for 50¢. Find the difference between the cost and the selling price.

6. Jim had 15¢. He earned 25¢ and bought a tablet for 20¢. How much did he have then?

7. Howard paid 35¢ for a knife and 45¢ for a ball. What was his change from a dollar?

8. Martha paid 25¢ a yard for 5 yards of ribbon and 5¢ for a spool of thread. How much did she spend?

9. Six boy scouts bought shoes at $3 a pair and caps at $2 each. What was the cost of the shoes and caps for the six scouts?

10. Margaret picked 12 quarts of berries. She gave 7 quarts to her mother and sold the rest for 15¢ a quart. How much money did she get?

11. A piece of land 10 rods by 16 rods contains how many square rods? how many acres?

12. Henry made 6 kites and sold them for 15¢ each. He spent $.30 for materials. What was his profit?

Thinking the Problem Through

Answer these questions. Then solve the problem.

A. What facts are given in the problem?
B. What is the question that is asked?
C. Which operations must be used to solve the problem?
D. What is the correct name for the answer?

1. How much can be saved by buying a bushel of potatoes for $1.25, instead of buying them at 37¢ a peck?

2. A farmer had 48 acres of wheat, which yielded 24 bushels per acre. At 87¢ a bushel, what was the value of his wheat?

3. Mr. Jones bought an auto for $932, trading in his old car for $150 and paying $232 in cash. He agreed to pay the balance at $50 a month. How many monthly payments must he make?

4. How much do I need to pay for three bars of soap at 6¢ each, a toothbrush at 45¢, and tooth powder at 36¢?

5. A field of corn is 60 rods long and 48 rods wide. How many acres are there in this field?

6. At $3 a square yard, what will it cost to lay a cement sidewalk 3 feet wide and 120 feet long?

7. Joyce bought an arithmetic for 72¢, a speller for 44¢, and a geography for $1.28. What was her change from a $5 bill?

8. In four weeks Harold earned the following amounts: $1.26, 55¢, $1.32, and 90¢. He put $1.50 in his savings bank and spent the rest. How much did he spend?

9. Mr. Adams bought a radio for $60. He paid $15 cash and the balance in nine equal payments. What was the amount of each payment?

Unit 15. Working with Fractions

Fractions of Pies and Cakes

1. Four girls have a small lemon pie to divide among themselves. Into how many equal pieces should the pie be cut?

2. What fraction shows 1 piece of this pie? 2 pieces? 3 pieces? 4 pieces? One fourth is written $\frac{1}{4}$.

3. Divide a circle into 2 equal parts or halves; then into 4 equal parts, or fourths. Read $\frac{1}{2}$, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$.

4. One half equals how many fourths? Two halves are how many fourths? $\frac{1}{2}=\frac{}{4}$ $\frac{2}{2}=\frac{}{4}$

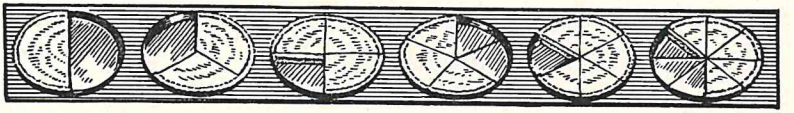
5. Ed's mother invited 5 boys to share a small birthday cake with him. What fraction of the cake should each boy get?

The number below the line, the **denominator,** tells into how many parts it was divided. The number above the line, the **numerator,** tells how many pieces each boy received.

6. Write the fractions for 1, 2, 3, 4, 5, and 6 pieces of Ed's cake.

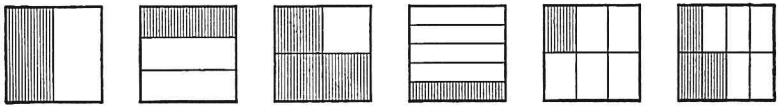
7. For each pie below write the fraction which shows the number of equal parts in the whole pie, as $\frac{2}{2}$, $\frac{3}{3}$, etc.

8. Write fractions for 1 equal part of each pie.



9. What fraction of each pie has been taken away? What fraction of each pie is left?

Fractions in Squares and Rectangles

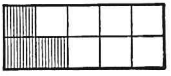


1. What fraction of each square above is shaded?

2. What fraction of each square above is not shaded?

3. For each square, what fraction shows all parts?

4. Draw the rectangle shown at the right. Shade $\frac{3}{10}$ of it. What fraction is not shaded?



5. In the fractions $\frac{3}{10}$ and $\frac{7}{10}$, what do the denominators tell? What do the numerators tell?

6. Draw a square and shade parts to show each fraction below. The denominators tell you how many equal parts there are in each square, and the numerators tell you how many parts to shade.

$\frac{1}{2}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{2}{5}$ $\frac{4}{5}$ $\frac{5}{6}$ $\frac{3}{8}$ $\frac{4}{8}$ $\frac{5}{8}$ $\frac{7}{8}$

7. Which is the larger fraction in each pair below?

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{6}$

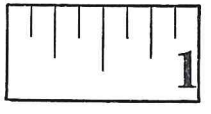
8. Write these fractions in figures:

one half	two thirds	one fourth	four fourths
two fifths	four fifths	three sixths	one eighth
two eighths	six eighths	one tenth	seven tenths

9. Fold a sheet of paper to show halves. Fold it again to show fourths. Fold it again to show eighths.

10. Fold a sheet of paper to show thirds and sixths.

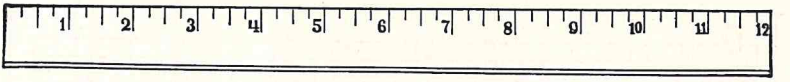
11. Divide an inch into halves, fourths, and eighths, as shown at the right.



12. Find these fractions of an inch:

$\frac{1}{2}$ $\frac{2}{2}$ $\frac{1}{4}$ $\frac{2}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{1}{8}$ $\frac{3}{8}$ $\frac{5}{8}$ $\frac{7}{8}$

Fractions of Measures



Change the fractions of a foot to inches.

1. $\frac{1}{2}$ ft. $\frac{1}{3}$ ft. $\frac{2}{3}$ ft. $\frac{1}{4}$ ft. $\frac{3}{4}$ ft. $\frac{1}{6}$ ft.

2. $\frac{5}{6}$ ft. $\frac{1}{12}$ ft. $\frac{5}{12}$ ft. $\frac{7}{12}$ ft. $\frac{11}{12}$ ft. $\frac{2}{2}$ ft.

Change the following inches to fractions of a foot:

3. 6 in. 3 in. 4 in. 1 in. 8 in. 9 in.

Change the fractions of a yard to inches.

4. $\frac{1}{2}$ yd. $\frac{1}{3}$ yd. $\frac{1}{4}$ yd. $\frac{1}{6}$ yd. $\frac{1}{9}$ yd. $\frac{1}{12}$ yd.

5. $\frac{2}{3}$ yd. $\frac{3}{4}$ yd. $\frac{5}{6}$ yd. $\frac{2}{9}$ yd. $\frac{5}{9}$ yd. $\frac{7}{9}$ yd.

6. $\frac{1}{12}$ yd. $\frac{5}{12}$ yd. $\frac{7}{12}$ yd. $\frac{11}{12}$ yd. $\frac{8}{9}$ yd. $\frac{4}{9}$ yd.

Change the fractions of a pound to ounces.

7. $\frac{1}{2}$ lb. $\frac{1}{4}$ lb. $\frac{3}{4}$ lb. $\frac{1}{8}$ lb. $\frac{3}{8}$ lb. $\frac{5}{8}$ lb.

8. $\frac{7}{8}$ lb. $\frac{1}{16}$ lb. $\frac{3}{16}$ lb. $\frac{5}{16}$ lb. $\frac{11}{16}$ lb. $\frac{15}{16}$ lb.

Change the fractions of an hour to minutes.

9. $\frac{1}{2}$ hr. $\frac{1}{3}$ hr. $\frac{1}{4}$ hr. $\frac{1}{5}$ hr. $\frac{1}{6}$ hr. $\frac{1}{10}$ hr.

10. $\frac{1}{12}$ hr. $\frac{2}{3}$ hr. $\frac{3}{4}$ hr. $\frac{4}{5}$ hr. $\frac{5}{6}$ hr. $\frac{7}{10}$ hr.

11. $\frac{7}{12}$ hr. $\frac{5}{12}$ hr. $\frac{9}{10}$ hr. $\frac{11}{12}$ hr. $\frac{3}{5}$ hr. $\frac{3}{10}$ hr.

Answer the following:

12. One pint is what fraction of a quart?

13. One quart is what fraction of a gallon?

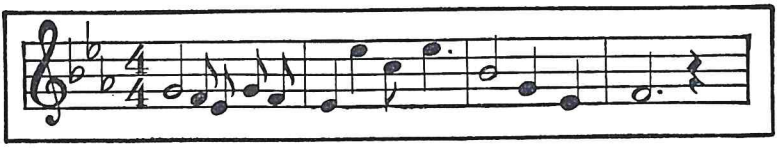
14. Two quarts is what fraction of a gallon?

15. One foot is what fraction of a yard?

16. Four inches is what fraction of 1 foot?

17. Thirty minutes is what fraction of 1 hour?

Using Fractions in Music



THE FIRST FOUR MEASURES FROM "OLD FOLKS AT HOME"

1. The numbers $\frac{4}{4}$ tell you that the music is written in four-four time. How many beats are there to a measure? What kind of note gets one beat?

2. Name the notes in the first measure. Write the fraction for each note. Find their sum. A half note and 4 eighth notes equal how many eighth notes?

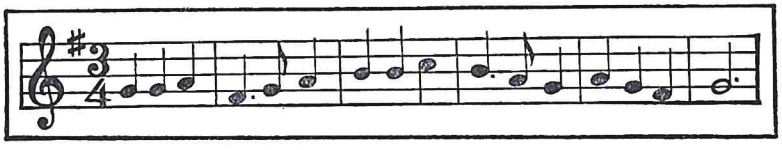
3. The sum of the notes in each measure equals how many quarter notes?

4. Find the sum of the notes in the second measure.

5. A dot placed after a note increases its length one half. A quarter note equals how many eighth notes? A dotted quarter note equals how many eighth notes?

6. Write the fractions for the dotted half note and the quarter rest in the fourth measure and find the sum.

7. A half note equals how many quarter notes? A dotted half note equals how many eighth notes?

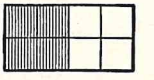


THE FIRST SIX MEASURES FROM "AMERICA"

8. In what time is "America" sung? How many beats are there to a measure? What kind of note to a beat? Write the fraction for each note in each measure.

Changing Fractions to Lowest Terms

1. Divide a rectangle into 8 equal parts and shade 4 of the parts.



You see that $\frac{4}{8}=\frac{1}{2}$. When you think $\frac{4}{8}=\frac{1}{2}$, you are changing $\frac{4}{8}$ to lowest terms. In $\frac{4}{8}$, 4 and 8 are called **terms.** A quick way to change $\frac{4}{8}$ to lowest terms is to divide both terms of the fraction by 4.

$$\frac{4 \div 4 = 1}{8 \div 4 = 2}$$

Draw a rectangle to show each of the changes below:

2. $\frac{2}{4}=\frac{1}{2}$ $\frac{3}{6}=\frac{1}{2}$ $\frac{2}{6}=\frac{1}{3}$ $\frac{4}{6}=\frac{2}{3}$ $\frac{2}{8}=\frac{1}{4}$

3. $\frac{6}{8}=\frac{3}{4}$ $\frac{3}{9}=\frac{1}{3}$ $\frac{6}{12}=\frac{1}{2}$ $\frac{3}{12}=\frac{1}{4}$ $\frac{4}{12}=\frac{1}{3}$

To change a fraction to lowest terms, divide both terms by the largest number that divides both exactly. For example, to change $\frac{9}{12}$ to lowest terms, divide both terms by 3. The result is $\frac{3}{4}$.

Change the following fractions to lowest terms:

4. $\frac{2}{4}$ $\frac{2}{8}$ $\frac{2}{6}$ $\frac{4}{6}$ $\frac{4}{8}$ $\frac{4}{12}$ $\frac{3}{6}$ $\frac{3}{12}$ $\frac{8}{12}$

5. $\frac{5}{10}$ $\frac{4}{16}$ $\frac{6}{9}$ $\frac{14}{16}$ $\frac{5}{25}$ $\frac{10}{25}$ $\frac{12}{14}$ $\frac{8}{14}$ $\frac{9}{12}$

Dividing both terms of a fraction by the same number does not change the value of the fraction. A fraction is in lowest terms when no number except 1 will divide both terms exactly.

Which of the fractions below are in lowest terms?

6. $\frac{2}{3}$ $\frac{4}{8}$ $\frac{1}{5}$ $\frac{2}{10}$ $\frac{5}{6}$ $\frac{4}{6}$ $\frac{2}{9}$ $\frac{3}{9}$ $\frac{5}{9}$

7. $\frac{3}{8}$ $\frac{5}{8}$ $\frac{6}{12}$ $\frac{5}{12}$ $\frac{8}{10}$ $\frac{5}{15}$ $\frac{3}{7}$ $\frac{2}{6}$ $\frac{6}{8}$

Reduce the fractions below to lowest terms:

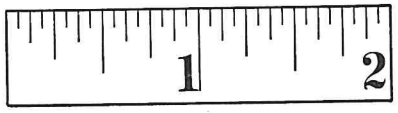
8. $\frac{4}{6}$ $\frac{4}{8}$ $\frac{5}{10}$ $\frac{4}{10}$ $\frac{6}{10}$ $\frac{8}{10}$ $\frac{2}{10}$ $\frac{2}{8}$ $\frac{6}{8}$

9. $\frac{6}{12}$ $\frac{2}{12}$ $\frac{3}{12}$ $\frac{4}{12}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{10}{12}$ $\frac{6}{9}$ $\frac{2}{16}$

10. $\frac{4}{16}$ $\frac{6}{16}$ $\frac{8}{16}$ $\frac{10}{16}$ $\frac{12}{16}$ $\frac{14}{16}$ $\frac{3}{15}$ $\frac{5}{15}$ $\frac{6}{15}$

Proper and Improper Fractions and Whole and Mixed Numbers

The marks on a ruler divide each inch into fractions less than 1.



1. Which of the following are less than 1?

$\frac{1}{2}$ $\frac{2}{2}$ $\frac{1}{4}$ $\frac{3}{4}$ $\frac{4}{4}$ $\frac{1}{8}$ $\frac{3}{8}$ $\frac{5}{8}$ $\frac{7}{8}$ $\frac{8}{8}$

Fractions which are less than 1 are called **proper fractions.** In proper fractions the numerators are smaller than the denominators.

2. One inch equals how many halves? fourths? eighths? sixteenths?

3. Tell which of these equal 1: $\frac{3}{3}$, $\frac{1}{3}$, $\frac{6}{6}$, $\frac{5}{6}$, $\frac{5}{5}$.

4. Which is longer, 1 in. or $\frac{3}{2}$ in.? 1 in. or $\frac{5}{4}$ in.?

5. Which of the fractions below equal more than 1?

$\frac{4}{3}$ $\frac{3}{5}$ $\frac{7}{4}$ $\frac{9}{2}$ $\frac{7}{7}$ $\frac{4}{2}$ $\frac{5}{8}$ $\frac{8}{5}$ $\frac{8}{9}$ $\frac{8}{4}$

Fractions which equal 1 or more than 1 are called **improper fractions.** Their numerators are equal to, or larger than, their denominators.

6. $1\frac{1}{2}$, $2\frac{3}{4}$, and $4\frac{7}{8}$ are called **mixed numbers.** A mixed number consists of a whole number and a fraction. Write three other mixed numbers.

To change an improper fraction to a whole number or to a mixed number, divide the numerator by the denominator.

$\frac{3}{2} = 3 \div 2 = 1\frac{1}{2}$ $\frac{8}{4} = 8 \div 4 = 2$ $\frac{10}{4} = 10 \div 4 = 2\frac{2}{4} = 2\frac{1}{2}$

Change the following to whole or mixed numbers:

7. $\frac{4}{3}$ $\frac{5}{3}$ $\frac{6}{3}$ $\frac{7}{3}$ $\frac{9}{3}$ $\frac{5}{4}$ $\frac{8}{4}$ $\frac{4}{2}$ $\frac{11}{4}$

8. $\frac{6}{5}$ $\frac{7}{5}$ $\frac{9}{5}$ $\frac{7}{6}$ $\frac{11}{6}$ $\frac{9}{8}$ $\frac{10}{5}$ $\frac{7}{7}$ $\frac{12}{6}$

Unit 16. Addition of Like Fractions

Learning to Add Fractions

You can add things with the same name; for example, you can add 3 eggs and 4 eggs. Fractions also have names, and it is easy to add fractions with the same name.

The denominators of $\frac{1}{4}$ and $\frac{2}{4}$ show their names to be "fourths." The numerators tell how many fourths each is. To add $\frac{1}{4}$ and $\frac{2}{4}$, think 1 fourth + 2 fourths = 3 fourths.

Fractions with the same denominator are **like fractions.** In each example below, things with the same denominator are added. To add $\frac{1}{3}$ and $\frac{1}{3}$, add only the numerators.

4 men	3 cents	1 third	$\frac{1}{3}$
5 men	8 cents	1 third	$\frac{1}{3}$
9 men	11 cents	2 thirds	$\frac{2}{3}$

1. Add $\frac{3}{8}+\frac{1}{8}$.

Think 3+1. Write $\frac{4}{8}$. Reduce $\frac{4}{8}$ to lowest terms. $\frac{4}{8}=\frac{1}{2}$.

$$\begin{array}{r} \frac{3}{8} \\ \frac{1}{8} \\ \hline \frac{4}{8}=\frac{1}{2} \end{array}$$

Add the following:

2.

$\frac{1}{5}$	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{3}{5}$	$\frac{1}{6}$
$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{2}{6}$	$\frac{1}{5}$	$\frac{4}{6}$

3.

$\frac{5}{8}$	$\frac{2}{4}$	$\frac{1}{5}$	$\frac{3}{6}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{4}{8}$
$\frac{1}{8}$	$\frac{2}{4}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{3}{5}$	$\frac{1}{8}$	$\frac{4}{6}$	$\frac{3}{8}$

4.

$\frac{1}{10}$	$\frac{1}{12}$	$\frac{3}{10}$	$\frac{3}{12}$	$\frac{4}{10}$	$\frac{5}{12}$	$\frac{3}{10}$	$\frac{2}{12}$
$\frac{1}{10}$	$\frac{1}{12}$	$\frac{1}{10}$	$\frac{4}{12}$	$\frac{3}{10}$	$\frac{3}{12}$	$\frac{2}{10}$	$\frac{7}{12}$

5. $\frac{1}{2}+\frac{1}{2}$ $\quad \frac{1}{3}+\frac{2}{3}$ $\quad \frac{1}{4}+\frac{3}{4}$ $\quad \frac{1}{5}+\frac{4}{5}$ $\quad \frac{1}{6}+\frac{5}{6}$

6. $\frac{7}{8}+\frac{1}{8}$ $\quad \frac{3}{8}+\frac{5}{8}$ $\quad \frac{3}{6}+\frac{3}{6}$ $\quad \frac{5}{10}+\frac{5}{10}$ $\quad \frac{3}{9}+\frac{6}{9}$

Writing Remainders as Fractions

1. One day the school lunch room bought 10 qt. of milk. How many gallons was this?

To change 10 qt. to gallons, think $10 \div 4 = 2\frac{2}{4} = 2\frac{1}{2}$. Do not write out the work. Write only 10 qt. $= 2\frac{1}{2}$ gal.

$$4\overline{)10} \quad 2\tfrac{2}{4} = 2\tfrac{1}{2}$$

2. A milk dealer has $4\frac{3}{4}$ gal. of milk to put into quart bottles. How many quarts can he fill?

To change $4\frac{3}{4}$ gal. to quarts, think $4 \times 4 + 3 = 19$. Do not write out the work. Write $4\frac{3}{4}$ gal. $= 19$ qt.

$$\begin{array}{r} 4 \text{ gal.} = 16 \text{ qt.} \\ \frac{3}{4} \text{ gal.} = \underline{\ 3 \text{ qt.}} \\ 19 \text{ qt.} \end{array}$$

Change the following gallons to quarts:

3. 1 gal. $\frac{1}{2}$ gal. $\frac{1}{4}$ gal. $\frac{3}{4}$ gal. $1\frac{1}{4}$ gal.

4. $1\frac{1}{2}$ gal. $1\frac{3}{4}$ gal. $2\frac{1}{2}$ gal. $3\frac{1}{4}$ gal. $3\frac{3}{4}$ gal.

Change the following quarts to gallons:

5. 4 qt. 5 qt. 6 qt. 7 qt. 8 qt.

6. 10 qt. 11 qt. 12 qt. 14 qt. 17 qt.

Change the following feet to inches:

7. $\frac{1}{2}$ ft. $\frac{1}{3}$ ft. $\frac{1}{4}$ ft. $1\frac{1}{6}$ ft. $1\frac{1}{3}$ ft.

8. $1\frac{3}{4}$ ft. $2\frac{2}{3}$ ft. $2\frac{5}{6}$ ft. $1\frac{1}{2}$ ft. $\frac{5}{12}$ ft.

9. $2\frac{1}{2}$ ft. $1\frac{1}{12}$ ft. $2\frac{1}{4}$ ft. $\frac{5}{6}$ ft. $1\frac{1}{4}$ ft.

Change the following inches to feet:

10. 6 in. 4 in. 3 in. 8 in. 9 in.

11. 2 in. 10 in. 1 in. 11 in. 18 in.

Change the following to whole or mixed numbers:

12. $\frac{2}{2}$ in. $\frac{4}{4}$ in. $\frac{8}{8}$ in. $\frac{9}{2}$ in. $\frac{11}{2}$ in.

13. $\frac{16}{16}$ in. $\frac{3}{2}$ in. $\frac{9}{8}$ in. $\frac{9}{4}$ in. $\frac{12}{2}$ in.

14. $\frac{7}{2}$ in. $\frac{13}{4}$ in. $\frac{14}{4}$ in. $\frac{16}{8}$ in. $\frac{15}{12}$ in.

Sight Work in Fractions

Copy those fractions which are in lowest terms. Reduce the others to lowest terms.

1. $\frac{1}{2}$ $\frac{2}{3}$ $\frac{2}{4}$ $\frac{1}{8}$ $\frac{2}{8}$ $\frac{2}{6}$ $\frac{1}{4}$ $\frac{5}{6}$ $\frac{3}{6}$

2. $\frac{4}{8}$ $\frac{6}{8}$ $\frac{2}{9}$ $\frac{1}{3}$ $\frac{3}{5}$ $\frac{4}{6}$ $\frac{2}{7}$ $\frac{5}{8}$ $\frac{3}{9}$

3. $\frac{3}{4}$ $\frac{6}{9}$ $\frac{7}{8}$ $\frac{2}{9}$ $\frac{2}{10}$ $\frac{3}{10}$ $\frac{5}{10}$ $\frac{6}{12}$ $\frac{5}{12}$

In the following, copy the proper fractions. Change the improper fractions to whole or mixed numbers.

4. $\frac{3}{4}$ $\frac{8}{4}$ $\frac{5}{4}$ $\frac{7}{8}$ $\frac{10}{2}$ $\frac{5}{3}$ $\frac{7}{4}$ $\frac{9}{2}$ $\frac{8}{9}$

5. $\frac{7}{3}$ $\frac{12}{8}$ $\frac{7}{6}$ $\frac{9}{4}$ $\frac{8}{5}$ $\frac{10}{5}$ $\frac{12}{4}$ $\frac{11}{2}$ $\frac{18}{10}$

6. $\frac{10}{3}$ $\frac{5}{6}$ $\frac{11}{5}$ $\frac{6}{2}$ $\frac{9}{5}$ $\frac{11}{4}$ $\frac{12}{5}$ $\frac{11}{3}$ $\frac{11}{12}$

Change the following improper fractions to whole or mixed numbers. All answers must be in lowest terms.

7. $\frac{5}{2}$ $\frac{6}{3}$ $\frac{5}{4}$ $\frac{4}{3}$ $\frac{3}{2}$ $\frac{6}{2}$ $\frac{6}{3}$ $\frac{6}{4}$ $\frac{6}{5}$

8. $\frac{5}{3}$ $\frac{7}{4}$ $\frac{8}{4}$ $\frac{7}{5}$ $\frac{9}{5}$ $\frac{7}{3}$ $\frac{8}{7}$ $\frac{9}{3}$ $\frac{9}{7}$

9. $\frac{8}{3}$ $\frac{7}{2}$ $\frac{8}{2}$ $\frac{8}{5}$ $\frac{10}{4}$ $\frac{8}{6}$ $\frac{15}{3}$ $\frac{15}{4}$ $\frac{15}{5}$

Practice until you can give the sums for the following quickly. Answers must be in lowest terms.

10. $\frac{1}{4}+\frac{3}{4}$ $\frac{1}{8}+\frac{3}{8}$ $\frac{1}{4}+\frac{1}{4}$ $\frac{1}{3}+\frac{2}{3}$ $\frac{3}{8}+\frac{7}{8}$

11. $\frac{2}{5}+\frac{3}{5}$ $\frac{5}{8}+\frac{1}{8}$ $\frac{2}{3}+\frac{2}{3}$ $\frac{1}{5}+\frac{4}{5}$ $\frac{1}{2}+\frac{1}{2}$

12. $\frac{1}{8}+\frac{1}{8}$ $\frac{1}{6}+\frac{1}{6}$ $\frac{3}{8}+\frac{3}{8}$ $\frac{3}{4}+\frac{3}{4}$ $\frac{5}{6}+\frac{5}{6}$

Problems

1. How many oranges will your mother need for serving 7 persons with a half orange each?

2. How many half dollars are there in $3.50?

3. How many quarters equal $2.25?

The Candy Shop

Edith's mother owns a candy shop. During her mother's absence Edith took charge of the store.

1. Mrs. Brown bought $1\frac{1}{2}$ lb. of chocolates at 50¢ a pound. How much did Edith charge for this candy?

2. Jerry had 10¢ and paid 5¢ for a candy bar. What part of his money did he spend?

3. Alfred bought 5¢ worth of caramels selling at 40¢ a pound. What part of a pound did he get?

4. Martha bought 2 lb. of chocolates at 55¢ a pound. What was her change from $2?

5. A woman bought a can of popcorn for 83¢. What was her change from two half dollars?

6. A man bought ice cream for 45¢, nuts for 25¢, and a box of candy for $2.25. What was his change from $5?

7. A half pound of candy is how many ounces more than a fourth of a pound?

8. Edith sold a 5-lb. box of candy for $2.75. What was the price per pound?

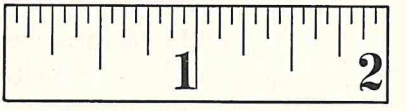
Practice in Addition of Fractions

1. Mildred bought 2 quarter pounds of butter. What fraction of a pound did she buy?

$\frac{1}{4}$
$\frac{1}{4}$
$\frac{2}{4} = \frac{1}{2}$

Think $\frac{1}{4} + \frac{1}{4} = \frac{2}{4} = \frac{1}{2}$. You can learn to add small fractions without paper and pencil.

Use the ruler to check each sum below. Copy the examples and find the sums.



2.

$\frac{1}{2}$ in.	$\frac{1}{4}$ in.	$\frac{1}{8}$ in.	$\frac{1}{8}$ in.	$\frac{1}{8}$ in.
$\frac{1}{2}$ in.	$\frac{3}{4}$ in.	$\frac{1}{8}$ in.	$\frac{3}{8}$ in.	$\frac{5}{8}$ in.
1 in.	1 in.	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.	$\frac{3}{4}$ in.

3.

$\frac{1}{8}$ in.	$\frac{3}{8}$ in.	$\frac{1}{16}$ in.	$\frac{1}{16}$ in.	$\frac{3}{16}$ in.
$\frac{7}{8}$ in.	$\frac{5}{8}$ in.	$\frac{1}{16}$ in.	$\frac{3}{16}$ in.	$\frac{5}{16}$ in.
1 in.	1 in.	$\frac{1}{8}$ in.	$\frac{1}{4}$ in.	$\frac{1}{2}$ in.

Add the following. Write sums on folded paper.

4.

$\frac{1}{6}$	$\frac{1}{16}$	$\frac{5}{16}$	$\frac{1}{10}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{1}{8}$
$\frac{1}{6}$	$\frac{5}{16}$	$\frac{1}{16}$	$\frac{1}{10}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{2}{8}$

5.

$\frac{7}{16}$	$\frac{5}{8}$	$\frac{3}{10}$	$\frac{1}{16}$	$\frac{2}{9}$	$\frac{1}{12}$	$\frac{3}{16}$	$\frac{1}{6}$
$\frac{7}{16}$	$\frac{3}{8}$	$\frac{3}{10}$	$\frac{7}{16}$	$\frac{4}{9}$	$\frac{1}{12}$	$\frac{9}{16}$	$\frac{5}{6}$

6.

$\frac{3}{16}$	$\frac{1}{9}$	$\frac{9}{16}$	$\frac{3}{10}$	$\frac{7}{16}$	$\frac{5}{12}$	$\frac{5}{16}$	$\frac{4}{9}$
$\frac{3}{16}$	$\frac{5}{9}$	$\frac{1}{16}$	$\frac{1}{10}$	$\frac{9}{16}$	$\frac{1}{12}$	$\frac{7}{16}$	$\frac{5}{9}$

7.

$\frac{1}{10}$	$\frac{15}{16}$	$\frac{1}{12}$	$\frac{11}{16}$	$\frac{5}{12}$	$\frac{1}{10}$	$\frac{7}{16}$	$\frac{1}{12}$
$\frac{3}{10}$	$\frac{1}{16}$	$\frac{7}{12}$	$\frac{1}{16}$	$\frac{5}{12}$	$\frac{7}{10}$	$\frac{3}{16}$	$\frac{5}{12}$

Give the lowest terms of each fraction below:

8. $\frac{2}{4}$ $\frac{4}{8}$ $\frac{6}{8}$ $\frac{2}{8}$ $\frac{4}{12}$ $\frac{3}{12}$ $\frac{8}{16}$ $\frac{12}{16}$

9. $\frac{6}{9}$ $\frac{8}{12}$ $\frac{10}{12}$ $\frac{4}{16}$ $\frac{12}{16}$ $\frac{4}{10}$ $\frac{8}{10}$ $\frac{9}{12}$

Remainders as Fractions

1. The five boys and one extra player on our basketball team weigh 64 lb., 72 lb., 53 lb., 68 lb., 71 lb., and 53 lb. Find the average weight of the boys.

Step 1. Add the six weights.

Step 2. Divide the total weight by 6. The answer is 63*r*3. Write the remainder over the divisor, 6, to make the fraction $\frac{3}{6}$. Reduce $\frac{3}{6}$ to lowest terms, $\frac{1}{2}$.

$$\begin{array}{r} 64 \\ 72 \\ 53 \\ 68 \\ 71 \\ 53 \\ \hline 6)381 \\ 63\frac{3}{6} = 63\frac{1}{2} \end{array}$$

2. Alfred's father drove his car on a 4-day trip. On Monday he drove 376 mi.; Tuesday, 429 mi.; Wednesday, 342 mi.; Thursday, 451 mi. What was the average distance per day?

3. Mrs. West paid 26¢ for 8 lb. of apples. What was the price per pound?

$$3\tfrac{2}{8} = 3\tfrac{1}{4}$$
$$8)\overline{26}$$

Divide the following. Write remainders as fractions.

4.	$7)\overline{43}$	$5)\overline{14}$	$8)\overline{18}$	$6)\overline{17}$	$9)\overline{24}$	$4)\overline{7}$
5.	$6)\overline{22}$	$7)\overline{52}$	$5)\overline{19}$	$3)\overline{17}$	$8)\overline{22}$	$3)\overline{7}$
6.	$4)\overline{11}$	$7)\overline{69}$	$5)\overline{23}$	$8)\overline{29}$	$9)\overline{32}$	$6)\overline{27}$
7.	$3)\overline{20}$	$5)\overline{28}$	$8)\overline{26}$	$7)\overline{68}$	$6)\overline{33}$	$4)\overline{15}$
8.	$9)\overline{47}$	$2)\overline{9}$	$5)\overline{32}$	$6)\overline{38}$	$7)\overline{31}$	$8)\overline{44}$
9.	$4)\overline{19}$	$9)\overline{53}$	$7)\overline{59}$	$5)\overline{34}$	$8)\overline{54}$	$6)\overline{41}$
10.	$9)\overline{62}$	$5)\overline{39}$	$8)\overline{61}$	$7)\overline{62}$	$3)\overline{26}$	$9)\overline{68}$
11.	$4)\overline{23}$	$6)\overline{46}$	$2)\overline{13}$	$5)\overline{47}$	$8)\overline{69}$	$7)\overline{68}$

Fourth Self-Test

Mixed Test

1.	$73\overline{)9847}$	$21\overline{)1987}$	$49\overline{)5406}$		$87\overline{)7067}$	
2.	82462	45012	58	98	37	54
	−42787	−27330	98	66	48	78
			23	64	65	39
3.	85323	574	47	59	46	75
	−16658	×97	74	15	78	47
4.	967	89412	68	85	29	96
	×48	−70775	75	56	57	63
			92	88	86	47
5.	908	79376	97	56	39	28
	×73	−42549	69	38	65	83
6.	$\frac{3}{4}+\frac{1}{4}$	$\frac{2}{3}+\frac{1}{3}$	$\frac{1}{8}+\frac{3}{8}$	$\frac{3}{8}+\frac{5}{8}$	$\frac{1}{5}+\frac{4}{5}$	

Test in Problems without Numbers

For each problem write A, S, M, or D on your paper.

1. If you know the speed at which a car was driven and the distance traveled, how do you find the time?

2. If you know the price of a ton of coal, how do you find the cost of a number of tons of coal?

3. If you know the amount of a man's salary for a year, how do you find his salary per month?

4. If you know the length and the width of a floor, how do you find the area of the floor?

5. If you know the time and the distance an airplane flies, how do you find its speed?

6. If you know the cost of a number of gallons of gasoline, how do you find the price per gallon?

Test in Sight Problems

Write the answer to each problem.

1. At 3 for 25¢, what will a dozen cans of beans cost?

2. Jerry bought 3 ties for $1.05. How much change did he get from $1.50?

3. If three ties cost $1.05, what will one tie cost?

4. When oranges sell at 30¢ a dozen, what will $2\frac{1}{2}$ dozen oranges cost?

5. Alfred has 25¢ in his purse. How much more will he need to pay for 9 three-cent stamps?

6. Ed said that 6 four-cent apples will cost more than 3 eight-cent oranges. Was he right?

7. How many quart bottles could you fill from 8 pints of water?

8. If you have 25¢ and spend 15¢ and then earn 20¢, how much money will you have?

9. A room is 10 feet long and 8 feet wide. How many feet is it around the room?

10. At 30¢ a dozen, what will 6 eggs cost?

11. At 10¢ a dozen, how many marbles can I get for five cents?

12. How many square feet are there in a lot 80 feet long and 50 feet wide?

13. One third of 12 is how much more than 3?

14. At 10¢ a dozen, what will $1\frac{1}{2}$ dozen pens cost?

15. Henry has saved 2 quarters. How many cents has he saved? What part of a dollar has he saved?

16. Find the cost of $2\frac{1}{2}$ doz. oranges at 40¢ a dozen.

Test What You Have Learned

Write the answers on your paper.

1.	60 mo. = ___ yr.	4 wk. = ___ da.	320 rd. = ___ mi.
2.	6 gal. = ___ qt.	20 pk. = ___ bu.	48 ft. = ___ yd.
3.	2 yd. = ___ in.	2 mi. = ___ rd.	$1\frac{1}{2}$ hr. = ___ min.
4.	3 da. = ___ hr.	$1\frac{1}{2}$ bu. = ___ pk.	12 qt. = ___ gal.
5.	$2\frac{1}{2}$ ft. = ___ in.	$3\frac{1}{2}$ qt. = ___ pt.	\$2.15 = ___¢
6.	42 da. = ___ wk.	$1\frac{1}{4}$ yr. = ___ mo.	60 ft. = ___ yd.
7.	$2\frac{1}{8}$ lb. = ___ oz.	96 hr. = ___ da.	$\frac{3}{4}$ hr. = ___ min.
8.	1 mi. = ___ ft.	$\frac{3}{4}$ lb. = ___ oz.	1 rd. = ___ ft.
9.	$\frac{5}{6}$ ft. = ___ in.	$\frac{2}{3}$ yd. = ___ in.	18 in. = ___ ft.
10.	$\frac{7}{8}$ lb. = ___ oz.	$\frac{3}{4}$ mi. = ___ rd.	$1\frac{2}{3}$ yd. = ___ ft.
11.	$1\frac{1}{3}$ yr. = ___ mo.	$2\frac{1}{2}$ T. = ___ lb.	24 hr. = ___ da.
12.	$\frac{4}{5}$ min. = ___ sec.	$1\frac{3}{4}$ hr. = ___ min.	$2\frac{1}{2}$ doz. = ___

13. What is the dividend in $57 \div 3 = 19$?

14. Name the multiplicand in $8 \times 16 = 128$.

15. Find the subtrahend in $701 - 97 = 604$.

16. Name the addends in $4 + 8 + 9 = 21$.

17. Which fraction is largest: $\frac{3}{4}$, $\frac{7}{8}$, or $\frac{1}{2}$?

18. Change $\frac{6}{12}$, $\frac{8}{12}$, and $\frac{9}{12}$ to lowest terms.

19. Change $\frac{3}{2}$, $\frac{9}{4}$, and $\frac{7}{6}$ to mixed numbers.

20. Change $\frac{8}{2}$, $\frac{9}{3}$, and $\frac{8}{8}$ to whole numbers.

21. Add 5 to the product of 7 times 4.

22. Subtract 6×4 from 8×3.

23. Divide the quotient in $48 \div 6$ by 2.

24. Find one-half the sum of $5 + 7 + 8$.

Problem Test

1. What is the distance around a room 15 feet long and 10 feet wide?

2. At $5 a square yard, what is the cost of laying a floor in a room 4 yd. long and 3 yd. wide?

3. Martha's father paid for 4 dinners at 85¢ each. What was his change from $10?

4. In an apple orchard there are 27 trees in each of 36 rows and 14 trees in a short row. How many trees are there in the orchard?

5. Mrs. Allen's grocery bills for 3 months were $52.65, $63.75, and $48.96. Find the average per month.

6. Mrs. Jones bought a dozen towels on sale for $3.70. The regular price was 35¢ each. How much did she save?

7. Find the cost of 6 gallons of gasoline at 19¢ a gallon and 5 quarts of oil at 25¢ a quart.

8. An overcoat which sold for $30 has been reduced $\frac{1}{3}$. What is the sale price?

9. Alfred's father drove his car 204 mi. on Monday and 180 mi. on Tuesday. He used 24 gal. of gas. How many miles did he drive per gallon?

10. At an average speed of 56 miles an hour, how long will it take a train to run 476 miles?

11. An airplane flew 1807 miles in 13 hours. What was its average speed?

12. At $4.50 a square yard, what is the cost of a rug 4 yards wide and 6 yards long?

13. Jim's father raised 1072 bu. of potatoes on a 16-acre field. Find the average yield per acre.

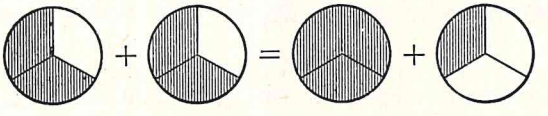
Unit 17. More Addition of Like Fractions

Practice in Fractions

1. Mildred bought $\frac{2}{3}$ yd. of white ribbon and $\frac{2}{3}$ yd. of blue ribbon. How many yards of ribbon did she buy?

Add $\frac{2}{3}$ and $\frac{2}{3}$. Think $\frac{2}{3}+\frac{2}{3}=\frac{4}{3}=1\frac{1}{3}$. She bought $1\frac{1}{3}$ yd.

$$\begin{array}{r} \frac{2}{3} \\ \frac{2}{3} \\ \hline \frac{4}{3}=1\frac{1}{3} \end{array}$$



2. What is $\frac{7}{8}$ mi. plus $\frac{5}{8}$ mi.?

Add $\frac{7}{8}$ and $\frac{5}{8}$. Think $\frac{7}{8}+\frac{5}{8}=\frac{12}{8}$. Think $\frac{12}{8}=1\frac{4}{8}=1\frac{1}{2}$.

$$\begin{array}{r} \frac{7}{8} \\ \frac{5}{8} \\ \hline \frac{12}{8}=1\frac{4}{8}=1\frac{1}{2} \end{array}$$

Add the following:

3.

$$\begin{array}{r} \frac{4}{5} \\ \frac{3}{5} \\ \hline \frac{7}{5}=1\frac{2}{5} \end{array} \qquad \begin{array}{r} \frac{3}{4} \\ \frac{3}{4} \\ \hline \frac{6}{4}=1\frac{1}{2} \end{array} \qquad \begin{array}{r} \frac{7}{10} \\ \frac{9}{10} \\ \hline \frac{16}{10}=1\frac{3}{5} \end{array} \qquad \begin{array}{r} \frac{8}{9} \\ \frac{7}{9} \\ \hline \frac{15}{9}=1\frac{2}{3} \end{array}$$

4.

$$\begin{array}{r} \frac{2}{5} \\ \frac{4}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{6}{7} \\ \frac{3}{7} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{6} \\ \frac{5}{6} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{9} \\ \frac{4}{9} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{9} \\ \frac{5}{9} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{7} \\ \frac{5}{7} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{8} \\ \frac{7}{8} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{5} \\ \frac{3}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{8} \\ \frac{3}{8} \\ \hline \end{array}$$

5.

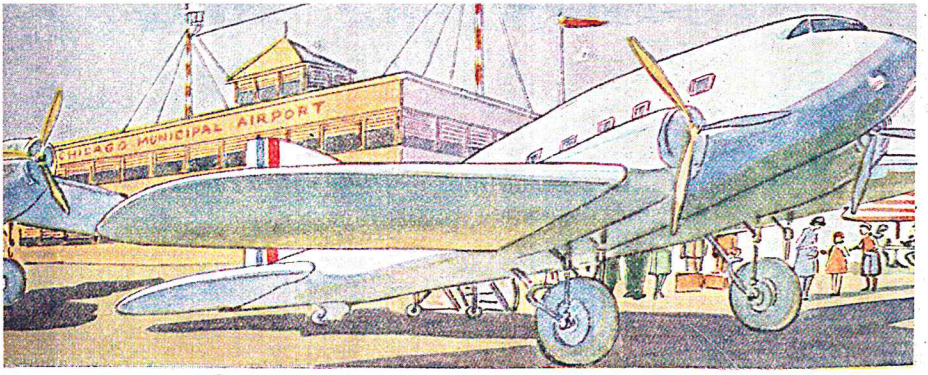
$$\begin{array}{r} \frac{9}{10} \\ \frac{7}{10} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{8} \\ \frac{5}{8} \\ \hline \end{array} \quad \begin{array}{r} \frac{8}{9} \\ \frac{2}{9} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{5} \\ \frac{4}{5} \\ \hline \end{array} \quad \begin{array}{r} \frac{6}{7} \\ \frac{2}{7} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{8} \\ \frac{7}{8} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{10} \\ \frac{9}{10} \\ \hline \end{array} \quad \begin{array}{r} \frac{8}{9} \\ \frac{4}{9} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{5} \\ \frac{2}{5} \\ \hline \end{array}$$

6.

$$\begin{array}{r} \frac{7}{8} \\ \frac{3}{8} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{10} \\ \frac{7}{10} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{16} \\ \frac{5}{16} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{12} \\ \frac{7}{12} \\ \hline \end{array} \quad \begin{array}{r} \frac{9}{10} \\ \frac{3}{10} \\ \hline \end{array} \quad \begin{array}{r} \frac{9}{16} \\ \frac{3}{16} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{12} \\ \frac{11}{12} \\ \hline \end{array} \quad \begin{array}{r} \frac{9}{10} \\ \frac{9}{10} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{8} \\ \frac{1}{8} \\ \hline \end{array}$$

7.

$$\begin{array}{r} \frac{11}{12} \\ \frac{7}{12} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{16} \\ \frac{9}{16} \\ \hline \end{array} \quad \begin{array}{r} \frac{11}{12} \\ \frac{5}{12} \\ \hline \end{array} \quad \begin{array}{r} \frac{3}{16} \\ \frac{7}{16} \\ \hline \end{array} \quad \begin{array}{r} \frac{7}{16} \\ \frac{7}{16} \\ \hline \end{array} \quad \begin{array}{r} \frac{5}{9} \\ \frac{8}{9} \\ \hline \end{array} \quad \begin{array}{r} \frac{9}{16} \\ \frac{9}{16} \\ \hline \end{array} \quad \begin{array}{r} \frac{2}{9} \\ \frac{4}{9} \\ \hline \end{array} \quad \begin{array}{r} \frac{1}{12} \\ \frac{5}{12} \\ \hline \end{array}$$



The Chicago Airport

For each problem write A, S, M, or D. Solve the problems.

1. One of the cement runways, or tracks, is 6600 ft. long and 178 ft. wide. Find the area of this runway.

2. The plane fare from New York to Chicago is $41.57. The railroad fare, including a berth, is $42.47. How much more expensive is the train fare?

3. The average number of planes arriving daily at the airport is 87. What is the number arriving per year?

4. The number of passengers arriving and leaving the airport in 1940 was 730,000. What was the average number per month?

5. A plane started from Chicago with 602 gallons of gasoline and landed at New York with 86 gallons. How many gallons of gasoline had it used?

6. A plane which usually flew at a speed of 210 miles per hour had its speed reduced $\frac{1}{7}$ by strong head winds. How fast was the plane flying then?

7. On a 720-mile trip a plane made 180 miles the first hour and 168 the second. How many more miles did it have to go? What fraction of the total distance had it covered by the end of the first hour?

Using Fractions in Problems

One fourth is often called a **quarter.** When we say a quarter of a yard, a quarter of a pound, or a quarter of a dollar, we mean one fourth. One fourth of a dollar is usually called a quarter.

1. Lucy bought a quarter of a pound of butter. How many ounces of butter did she get?

2. If you buy a quarter of a yard of ribbon, how many inches of ribbon do you get?

3. How many inches do you get if you buy one-half yard?

4. Joyce practiced her music lesson for a quarter of an hour, and Mildred practiced for a half hour. How many minutes did each girl practice?

5. Walter had six marbles and lost two of them. What part of the marbles did he lose? What part of the marbles did he have left?

6. How many inches more is $\frac{1}{2}$ yard than $\frac{1}{4}$ yard?

7. At 40¢ a yard, what is the cost of $\frac{1}{4}$ yd. of ribbon?

8. Harold wants to change 75 pennies for quarters. How many quarters can he get for his pennies?

9. How many quarters can Jerry get for a dollar?

10. Get a yardstick and show that one-quarter yard is 9 inches, one-third yard is 12 inches, one-half yard is 18 inches, and three quarters of a yard is 27 inches.

11. Draw a circle and divide it into 8 equal parts. Show that 4 eighths equal 1 half.

12. Henry has a basket that weighs one pound. He bought five pounds of groceries and put them into the basket. What part of the total weight did the basket weigh?

Sight Work in Fractions

Reduce to lowest terms. Write answers on folded paper.

1. $\frac{2}{4}$ $\frac{2}{8}$ $\frac{4}{8}$ $\frac{3}{6}$ $\frac{3}{9}$ $\frac{2}{10}$ $\frac{2}{12}$ $\frac{2}{6}$ $\frac{10}{20}$

2. $\frac{3}{12}$ $\frac{4}{10}$ $\frac{6}{12}$ $\frac{3}{12}$ $\frac{6}{8}$ $\frac{4}{16}$ $\frac{8}{12}$ $\frac{6}{9}$ $\frac{15}{20}$

3. $\frac{5}{10}$ $\frac{9}{12}$ $\frac{6}{16}$ $\frac{6}{10}$ $\frac{10}{12}$ $\frac{4}{6}$ $\frac{8}{10}$ $\frac{4}{12}$ $\frac{3}{15}$

Reduce each improper fraction below to a whole or mixed number. Use folded paper for answers.

4. $\frac{3}{2}$ $\frac{4}{3}$ $\frac{4}{4}$ $\frac{6}{5}$ $\frac{5}{3}$ $\frac{7}{6}$ $\frac{8}{5}$ $\frac{5}{4}$ $\frac{9}{2}$

5. $\frac{8}{6}$ $\frac{6}{4}$ $\frac{9}{7}$ $\frac{9}{6}$ $\frac{10}{6}$ $\frac{10}{8}$ $\frac{7}{4}$ $\frac{12}{8}$ $\frac{8}{3}$

6. $\frac{5}{5}$ $\frac{8}{7}$ $\frac{7}{5}$ $\frac{11}{6}$ $\frac{9}{8}$ $\frac{12}{8}$ $\frac{15}{8}$ $\frac{14}{8}$ $\frac{10}{5}$

Add the following. Reduce sums to lowest terms.

7.

$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{3}{5}$	$\frac{3}{7}$	$\frac{2}{5}$	$\frac{1}{10}$
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{4}{5}$	$\frac{7}{8}$	$\frac{5}{6}$	$\frac{1}{5}$	$\frac{1}{7}$	$\frac{2}{5}$	$\frac{3}{10}$

8.

$\frac{1}{3}$	$\frac{5}{8}$	$\frac{2}{5}$	$\frac{5}{6}$	$\frac{3}{7}$	$\frac{3}{8}$	$\frac{2}{9}$	$\frac{1}{4}$	$\frac{1}{12}$
$\frac{2}{3}$	$\frac{1}{8}$	$\frac{3}{5}$	$\frac{1}{6}$	$\frac{4}{7}$	$\frac{3}{8}$	$\frac{1}{9}$	$\frac{3}{4}$	$\frac{3}{12}$

9.

$\frac{3}{10}$	$\frac{1}{12}$	$\frac{2}{5}$	$\frac{1}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{1}{16}$	$\frac{1}{6}$
$\frac{3}{10}$	$\frac{5}{12}$	$\frac{4}{5}$	$\frac{3}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{13}{16}$	$\frac{1}{6}$

Sight Problems

1. At 3 bars for 10¢, how many bars of soap can I buy for 50¢?

2. At 80¢ a pound, what is the cost of $\frac{3}{4}$ lb. of candy? (Hint: $\frac{1}{4}$ lb. costs 20¢. $\frac{3}{4}$ lb. will cost 3 times as much as $\frac{1}{4}$ lb.)

3. At 36¢ a pound, what does $\frac{3}{4}$ of a pound of steak cost?

4. Lucy bought $\frac{1}{4}$ lb. of candy. How many ounces is that?

Using Fractions

When oranges cost 60¢ per dozen, find the cost of:

1. 1 orange 2 oranges 6 oranges 4 oranges

2. 8 oranges 3 oranges 9 oranges 10 oranges

3. 7 oranges 5 oranges $\frac{1}{2}$ dozen $\frac{2}{3}$ dozen

4. $\frac{1}{4}$ dozen $\frac{1}{3}$ dozen $\frac{3}{4}$ dozen $1\frac{1}{2}$ dozen

When potatoes cost $1 per bushel, find the cost of:

5. 1 pk. 5 pk. 2 pk. 3 pk. $\frac{1}{2}$ pk. 6 pk.

6. $\frac{1}{2}$ bu. $\frac{1}{4}$ bu. $\frac{3}{4}$ bu. $1\frac{3}{4}$ bu. $1\frac{1}{2}$ bu. $2\frac{1}{2}$ bu.

When candy sells at 40¢ per pound, find the cost of:

7. 8 oz. 4 oz. 6 oz. 10 oz. 2 oz. 12 oz.

8. $\frac{1}{4}$ lb. $\frac{1}{2}$ lb. $\frac{1}{8}$ lb. $\frac{3}{8}$ lb. $\frac{5}{8}$ lb. $\frac{7}{8}$ lb.

When peaches are 20¢ a can, find the cost of the following number of cans:

9. $\frac{1}{2}$ doz. $\frac{1}{3}$ doz. $\frac{1}{4}$ doz. $\frac{1}{6}$ doz. $\frac{1}{12}$ doz. $1\frac{1}{2}$ doz.

10. $\frac{2}{3}$ doz. $\frac{3}{4}$ doz. $\frac{5}{6}$ doz. $\frac{5}{12}$ doz. $2\frac{1}{4}$ doz. 3 doz.

When pears are 2 cans for 37¢, find the cost of:

11. 4 cans 6 cans 8 cans $\frac{1}{2}$ doz. $\frac{1}{3}$ doz. 1 doz.

12. 10 cans 12 cans $\frac{1}{6}$ doz. $1\frac{1}{2}$ doz. $2\frac{1}{3}$ doz. 4 doz.

When oil is $1 a gallon, find the cost of:

13. 3 qt. 6 qt. 5 qt. 4 qt. 9 qt. 10 qt.

14. $\frac{3}{4}$ gal. $\frac{1}{2}$ gal. 2 pt. $1\frac{1}{4}$ gal. $2\frac{1}{2}$ gal. 1 qt.

Problems

1. Name several articles that are sold by the quart; by the ton; by the gallon.

2. At 40¢ a dozen, what will $1\frac{1}{2}$ dozen eggs cost?

Practice in Fractions

Reduce each fraction to lowest terms.

1. $\frac{2}{4}$ $\frac{2}{6}$ $\frac{6}{9}$ $\frac{2}{8}$ $\frac{9}{12}$ $\frac{2}{10}$ $\frac{10}{15}$ $\frac{5}{20}$

2. $\frac{4}{6}$ $\frac{3}{12}$ $\frac{6}{24}$ $\frac{3}{6}$ $\frac{12}{18}$ $\frac{3}{99}$ $\frac{12}{16}$ $\frac{6}{12}$

3. $\frac{16}{24}$ $\frac{15}{20}$ $\frac{6}{18}$ $\frac{4}{16}$ $\frac{6}{8}$ $\frac{4}{8}$ $\frac{8}{12}$ $\frac{5}{15}$

4. $\frac{4}{12}$ $\frac{2}{12}$ $\frac{5}{10}$ $\frac{8}{24}$ $\frac{10}{12}$ $\frac{8}{16}$ $\frac{18}{24}$ $\frac{10}{20}$

Reduce the improper fractions below to whole or mixed numbers. Write answers in lowest terms.

5. $\frac{6}{4}$ $\frac{7}{6}$ $\frac{9}{8}$ $\frac{13}{12}$ $\frac{10}{9}$ $\frac{8}{5}$ $\frac{11}{10}$ $\frac{10}{5}$

6. $\frac{15}{12}$ $\frac{17}{16}$ $\frac{8}{6}$ $\frac{7}{4}$ $\frac{10}{8}$ $\frac{12}{10}$ $\frac{9}{6}$ $\frac{12}{8}$

7. $\frac{18}{16}$ $\frac{9}{4}$ $\frac{14}{10}$ $\frac{12}{9}$ $\frac{16}{12}$ $\frac{10}{4}$ $\frac{13}{9}$ $\frac{18}{12}$

Add the following fractions:

8. $\frac{5}{12}+\frac{7}{12}$ $\frac{7}{10}+\frac{9}{10}$ $\frac{1}{9}+\frac{5}{9}$ $\frac{2}{3}+\frac{2}{3}$ $\frac{4}{9}+\frac{4}{9}$ $\frac{7}{8}+\frac{5}{8}$ $\frac{4}{9}+\frac{8}{9}$ $\frac{3}{4}+\frac{3}{4}$

9. $\frac{9}{10}+\frac{1}{10}$ $\frac{7}{9}+\frac{5}{9}$ $\frac{3}{8}+\frac{7}{8}$ $\frac{4}{9}+\frac{7}{9}$ $\frac{5}{6}+\frac{5}{6}$ $\frac{3}{10}+\frac{7}{10}$ $\frac{3}{16}+\frac{15}{16}$ $\frac{3}{7}+\frac{6}{7}$

10. $\frac{9}{10}+\frac{7}{10}$ $\frac{4}{7}+\frac{3}{7}$ $\frac{7}{8}+\frac{7}{8}$ $\frac{9}{10}+\frac{3}{10}$ $\frac{7}{12}+\frac{7}{12}$ $\frac{8}{9}+\frac{5}{9}$ $\frac{1}{12}+\frac{11}{12}$ $\frac{7}{9}+\frac{8}{9}$

11. $\frac{6}{7}+\frac{6}{7}$ $\frac{3}{16}+\frac{1}{16}$ $\frac{1}{16}+\frac{11}{16}$ $\frac{7}{16}+\frac{3}{16}$ $\frac{1}{12}+\frac{5}{12}$ $\frac{3}{16}+\frac{5}{16}$ $\frac{5}{12}+\frac{5}{12}$ $\frac{3}{16}+\frac{9}{16}$

12. $\frac{8}{9}+\frac{8}{9}$ $\frac{5}{12}+\frac{11}{12}$ $\frac{9}{10}+\frac{9}{10}$ $\frac{1}{16}+\frac{15}{16}$ $\frac{15}{16}+\frac{9}{16}$ $\frac{2}{9}+\frac{4}{9}$ $\frac{9}{16}+\frac{11}{16}$ $\frac{11}{12}+\frac{7}{12}$

Unit 18. Subtraction of Like Fractions

Learning to Subtract Fractions

1. Edith's mother bought $\frac{2}{3}$ yd. of ribbon. After using $\frac{1}{3}$ yd., how much did she have left?

Subtract $\frac{1}{3}$ from $\frac{2}{3}$. Think $\frac{2}{3}-\frac{1}{3}=\frac{1}{3}$. Write $\frac{1}{3}$.

$$\begin{array}{r} \frac{2}{3} \\ \frac{1}{3} \\ \hline \frac{1}{3} \end{array}$$

2. Subtract $\frac{3}{4}$ from $\frac{3}{4}$.

If you subtract a number from another number the same size, the remainder is zero.

3. Alfred has two boards, one $\frac{7}{8}$ in. thick and the other $\frac{3}{8}$ in. thick. The first board is how much thicker?

Subtract $\frac{3}{8}$ from $\frac{7}{8}$. Think $\frac{7}{8}-\frac{3}{8}=\frac{4}{8}=\frac{1}{2}$.

$$\begin{array}{r} \frac{7}{8} \\ \frac{3}{8} \\ \hline \frac{1}{2} \end{array}$$

Subtract the fractions below. Reduce remainders to lowest terms.

4.	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{5}{7}$	$\frac{7}{9}$	$\frac{8}{9}$	$\frac{5}{6}$	$\frac{6}{7}$	$\frac{5}{8}$
	$\frac{1}{3}$	$\frac{1}{5}$	$\frac{3}{7}$	$\frac{2}{9}$	$\frac{1}{9}$	$\frac{5}{6}$	$\frac{3}{7}$	$\frac{1}{8}$
5.	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{6}$	$\frac{7}{9}$	$\frac{7}{8}$	$\frac{5}{9}$	$\frac{3}{8}$
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{4}{9}$	$\frac{1}{8}$	$\frac{2}{9}$	$\frac{1}{8}$
6.	$\frac{7}{9}$	$\frac{3}{8}$	$\frac{2}{5}$	$\frac{7}{12}$	$\frac{9}{10}$	$\frac{9}{16}$	$\frac{11}{12}$	$\frac{7}{8}$
	$\frac{1}{9}$	$\frac{3}{8}$	$\frac{1}{5}$	$\frac{1}{12}$	$\frac{1}{10}$	$\frac{1}{16}$	$\frac{1}{12}$	$\frac{5}{8}$
7.	$\frac{7}{12}$	$\frac{11}{16}$	$\frac{9}{16}$	$\frac{7}{10}$	$\frac{11}{12}$	$\frac{15}{16}$	$\frac{11}{12}$	$\frac{8}{9}$
	$\frac{5}{12}$	$\frac{3}{16}$	$\frac{7}{16}$	$\frac{3}{10}$	$\frac{7}{12}$	$\frac{3}{16}$	$\frac{5}{12}$	$\frac{5}{9}$
8.	$\frac{8}{9}$	$\frac{9}{10}$	$\frac{3}{8}$	$\frac{11}{12}$	$\frac{9}{10}$	$\frac{2}{3}$	$\frac{3}{7}$	$\frac{7}{8}$
	$\frac{7}{9}$	$\frac{3}{10}$	$\frac{1}{8}$	$\frac{7}{12}$	$\frac{7}{10}$	$\frac{1}{3}$	$\frac{1}{7}$	$\frac{2}{8}$

Addition of Mixed Numbers

1. A tailor used $4\frac{1}{4}$ yd. and $3\frac{1}{4}$ yd. of cloth for two suits. How much cloth did he need?

$$\begin{array}{r} 4\frac{1}{4} \\ 3\frac{1}{4} \\ \hline 7\frac{1}{2} \end{array}$$

Add $4\frac{1}{4}$ and $3\frac{1}{4}$. Think $\frac{1}{4}+\frac{1}{4}=\frac{2}{4}=\frac{1}{2}$. Write $\frac{1}{2}$. Add the whole numbers. Write 7. He needed $7\frac{1}{2}$ yards of cloth for both suits.

2. Add $5\frac{1}{3}$ and $3\frac{2}{3}$.

$$\begin{array}{r} 5\frac{1}{3} \\ 3\frac{2}{3} \\ \hline 9 \end{array}$$

Think $\frac{1}{3}+\frac{2}{3}=\frac{3}{3}=1$. $1+5+3=9$.

3. Esther's mother bought 2 ducks weighing $5\frac{3}{4}$ lb. and $4\frac{3}{4}$ lb. What did both weigh?

$$\begin{array}{r} 5\frac{3}{4} \\ 4\frac{3}{4} \\ \hline 10\frac{1}{2} \end{array}$$

Add $5\frac{3}{4}$ and $4\frac{3}{4}$. Think $\frac{3}{4}+\frac{3}{4}=\frac{6}{4}=1\frac{2}{4}=1\frac{1}{2}$. Write $\frac{1}{2}$ and carry 1. Add $1+5+4$. Write 10.

Add the following. Reduce sums to lowest terms.

4.

$4\frac{1}{5}$	$6\frac{1}{8}$	$4\frac{3}{8}$	$5\frac{1}{4}$	$8\frac{4}{5}$	$6\frac{1}{6}$	$2\frac{7}{8}$
$3\frac{1}{5}$	$4\frac{3}{8}$	$2\frac{3}{8}$	$3\frac{3}{4}$	$5\frac{3}{5}$	$2\frac{1}{6}$	$3\frac{5}{8}$
$7\frac{2}{5}$	$10\frac{1}{2}$	$6\frac{3}{4}$	9	$14\frac{2}{5}$	$8\frac{1}{3}$	$6\frac{1}{2}$

5.

$4\frac{1}{3}$	$3\frac{1}{2}$	$1\frac{3}{4}$	$3\frac{1}{8}$	$2\frac{5}{6}$	$5\frac{2}{5}$	$1\frac{11}{12}$
$3\frac{1}{3}$	$5\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{8}$	$4\frac{1}{6}$	$2\frac{3}{5}$	$3\frac{1}{12}$

6.

$6\frac{5}{8}$	$7\frac{2}{3}$	$8\frac{1}{5}$	$5\frac{3}{5}$	$5\frac{1}{8}$	$4\frac{5}{8}$	$3\frac{3}{7}$
$3\frac{1}{8}$	$2\frac{2}{3}$	$3\frac{3}{5}$	$3\frac{2}{5}$	$4\frac{5}{8}$	$6\frac{3}{8}$	$2\frac{2}{7}$

7.

$2\frac{4}{7}$	$6\frac{1}{10}$	$4\frac{5}{8}$	$7\frac{2}{9}$	$3\frac{7}{8}$	$5\frac{8}{9}$	$2\frac{7}{10}$
$3\frac{5}{7}$	$3\frac{1}{10}$	$5\frac{5}{8}$	$2\frac{1}{9}$	$1\frac{5}{8}$	$3\frac{1}{9}$	$4\frac{9}{10}$

8.

$7\frac{4}{5}$	$9\frac{4}{5}$	$6\frac{7}{9}$	$4\frac{2}{9}$	$3\frac{5}{6}$	$7\frac{1}{12}$	$4\frac{7}{16}$
$2\frac{2}{5}$	$6\frac{4}{5}$	$2\frac{7}{9}$	$6\frac{4}{9}$	$4\frac{5}{6}$	$3\frac{5}{12}$	$5\frac{5}{16}$

9.

$3\frac{2}{3}$	$2\frac{5}{12}$	$5\frac{3}{5}$	$5\frac{1}{8}$	$2\frac{3}{16}$	$6\frac{3}{10}$	$1\frac{2}{5}$
$4\frac{1}{3}$	$5\frac{7}{12}$	$4\frac{4}{5}$	$3\frac{7}{8}$	$1\frac{5}{16}$	$5\frac{9}{10}$	$6\frac{4}{5}$

Subtraction of Mixed Numbers

1. A wire $5\frac{5}{6}$ ft. long broke off $2\frac{1}{6}$ ft. from one end. How many feet of wire were left?

$$\begin{array}{r} 5\frac{5}{6} \\ 2\frac{1}{6} \\ \hline 3\frac{2}{3} \end{array}$$

Subtract $2\frac{1}{6}$ from $5\frac{5}{6}$. Think $\frac{5}{6}-\frac{1}{6}=\frac{4}{6}=\frac{2}{3}$. Write $\frac{2}{3}$. Think $5-2=3$. Write 3.

2. Subtract $3\frac{4}{5}$ from $7\frac{4}{5}$.

$$\begin{array}{r} 7\frac{4}{5} \\ 3\frac{4}{5} \\ \hline 4 \end{array}$$

Think $\frac{4}{5}-\frac{4}{5}=0$. Do not write this 0. Think $7-3=4$. Write 4.

Subtract the following:

3.	$\frac{5}{8}$	$6\frac{5}{8}$	$4\frac{4}{5}$	$7\frac{9}{10}$	$6\frac{3}{16}$	$7\frac{2}{3}$	$4\frac{3}{8}$
	$\frac{5}{8}$	$3\frac{5}{8}$	$1\frac{1}{5}$	$2\frac{7}{10}$	$1\frac{1}{16}$	3	$2\frac{1}{8}$
	0	3	$3\frac{3}{5}$	$5\frac{1}{5}$	$5\frac{1}{8}$	$4\frac{2}{3}$	$2\frac{1}{4}$
4.	$3\frac{2}{3}$	$2\frac{7}{8}$	$9\frac{7}{8}$	$4\frac{3}{10}$	$7\frac{7}{8}$	$8\frac{7}{8}$	$3\frac{9}{10}$
	$\frac{1}{3}$	$1\frac{1}{8}$	5	$2\frac{1}{10}$	$5\frac{5}{8}$	$6\frac{3}{8}$	$1\frac{3}{10}$
5.	$5\frac{5}{8}$	$8\frac{3}{4}$	$3\frac{5}{12}$	$7\frac{5}{8}$	$5\frac{11}{12}$	$7\frac{7}{12}$	$2\frac{11}{12}$
	$2\frac{1}{8}$	$3\frac{1}{4}$	$2\frac{1}{12}$	$5\frac{3}{8}$	$4\frac{5}{12}$	$7\frac{5}{12}$	$1\frac{7}{12}$
6.	$3\frac{7}{10}$	$7\frac{5}{16}$	$12\frac{4}{5}$	$16\frac{2}{5}$	$9\frac{7}{8}$	$7\frac{5}{7}$	$3\frac{5}{6}$
	$1\frac{1}{10}$	$4\frac{3}{16}$	$\frac{3}{5}$	$\frac{1}{5}$	$\frac{5}{8}$	$\frac{3}{7}$	$3\frac{1}{6}$

Give the answers to the following. Watch the signs.

7.	$\frac{1}{5}+\frac{2}{5}$	$\frac{5}{9}-\frac{2}{9}$	$\frac{5}{7}+\frac{2}{7}$	$\frac{3}{4}-\frac{1}{4}$	$\frac{7}{16}+\frac{1}{16}$
8.	$\frac{5}{16}-\frac{1}{16}$	$\frac{7}{12}+\frac{1}{12}$	$\frac{5}{8}-\frac{1}{8}$	$\frac{7}{8}+\frac{3}{8}$	$\frac{3}{10}-\frac{1}{10}$
9.	$\frac{2}{9}+\frac{5}{9}$	$\frac{3}{7}+\frac{5}{7}$	$\frac{7}{16}-\frac{1}{16}$	$\frac{7}{8}-\frac{5}{8}$	$\frac{15}{16}+\frac{3}{16}$
10.	$\frac{11}{16}-\frac{1}{16}$	$\frac{5}{9}+\frac{2}{9}$	$\frac{7}{12}-\frac{1}{12}$	$\frac{8}{9}-\frac{2}{9}$	$\frac{5}{12}-\frac{1}{12}$
11.	$\frac{5}{16}+\frac{1}{16}$	$\frac{5}{9}+\frac{8}{9}$	$\frac{7}{10}-\frac{3}{10}$	$\frac{2}{9}+\frac{8}{9}$	$\frac{13}{16}-\frac{1}{16}$
12.	$\frac{1}{10}+\frac{9}{10}$	$\frac{1}{9}-\frac{1}{9}$	$\frac{1}{12}+\frac{1}{12}$	$\frac{2}{7}+\frac{6}{7}$	$\frac{3}{16}+\frac{13}{16}$

Sight Problems

Solve each problem without writing the figures.

1. A sheet of letter paper is $6\frac{1}{4}$ inches wide, and the envelope is $6\frac{3}{4}$ inches wide. The envelope is how much wider than the paper?

2. A clerk sold $4\frac{1}{3}$ yards of cloth to one woman and $5\frac{2}{3}$ yards to another. How many yards did he sell?

3. Mrs. Harrison had $8\frac{3}{4}$ yards of cloth and used $4\frac{1}{4}$ yards for a dress. How many yards does she have left?

4. Edith used $\frac{2}{3}$ of a yard of lace for a handkerchief and $3\frac{2}{3}$ yards for dolls' dresses. How many yards did she use?

5. Henry is $55\frac{3}{8}$ in. tall, and his father is $71\frac{7}{8}$ in. tall. His father is how much taller than Henry?

6. Mildred's mother used $3\frac{3}{4}$ yards of cloth for a dress and 4 yards for some aprons. How many yards did she use?

7. Susan bought $7\frac{1}{2}$ yd. of goods. After making a dress she had $4\frac{1}{2}$ yd. left. How many yards did she use?

8. At a speed of 3 miles an hour, how long will it take to go 16 miles? How many hours and minutes is this?

9. A box of apples weighed $49\frac{1}{2}$ lb. The empty box weighed $2\frac{1}{2}$ lb. What did the apples weigh?

10. Esther weighs $59\frac{3}{4}$ lb., and Lucy weighs $57\frac{1}{4}$ lb. Lucy is how many pounds lighter than Esther?

11. Some boy scouts hiked $7\frac{1}{2}$ miles in the morning and $8\frac{1}{2}$ miles in the afternoon. How far did they hike?

12. Margaret weighs $62\frac{1}{4}$ lb. without her winter coat on. Her winter coat weighs $2\frac{1}{4}$ lb. How much does she weigh with her coat on?

Henry's Delivery Service

Henry has made arrangements with his friend Bob, who lives on a farm, to sell eggs in town. Below are listed some of Henry's customers and the number of dozen eggs they bought during January.

1. How many dozen eggs did each of his customers buy during January? (If you cannot add four fractions at once, add two and then two again. Then add the two sums.)

Customers	Jan. 6	Jan. 13	Jan. 20	Jan. 27	Total
Mrs. Adams	$\frac{1}{2}$	$\frac{1}{2}$	$1\frac{1}{2}$	$\frac{1}{2}$	
Mrs. Allen	2	$1\frac{1}{4}$	$1\frac{3}{4}$		
Mrs. Brown	$1\frac{1}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$		
Mrs. Davis	$\frac{3}{4}$	$1\frac{1}{4}$		$1\frac{1}{4}$	
Mrs. Jones	$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{1}{2}$	2	

2. How many dozen more did Mrs. Jones buy than Mrs. Adams?

3. How many dozen more did Mrs. Brown buy than Mrs. Davis?

4. How many dozen eggs did Henry deliver to Mrs. Davis and Mrs. Brown together?

5. How many dozen more did Mrs. Allen buy on January 20 than on January 13?

6. How many dozen did Mrs. Brown buy on January 13 and January 20 together?

Practice in Addition and Subtraction of Fractions

Write the sums. Do not copy the examples.

1.	$\frac{1}{2}+\frac{1}{2}$	$\frac{1}{6}+\frac{1}{6}$	$\frac{1}{8}+\frac{1}{8}$	$1\frac{2}{3}+\frac{1}{3}$
2.	$\frac{3}{8}+\frac{1}{8}$	$\frac{1}{4}+\frac{1}{4}$	$\frac{1}{8}+\frac{7}{8}$	$3\frac{1}{2}+2\frac{1}{2}$
3.	$\frac{5}{8}+\frac{1}{8}$	$\frac{1}{4}+\frac{3}{4}$	$\frac{3}{8}+\frac{5}{8}$	$4\frac{1}{4}+2\frac{1}{4}$
4.	$\frac{7}{8}+\frac{5}{8}$	$\frac{3}{4}+\frac{3}{4}$	$\frac{3}{8}+\frac{3}{8}$	$1\frac{3}{4}+3\frac{1}{4}$
5.	$\frac{3}{8}+\frac{7}{8}$	$\frac{3}{5}+\frac{2}{5}$	$\frac{5}{8}+\frac{5}{8}$	$1\frac{2}{5}+3\frac{4}{5}$
6.	$\frac{3}{5}+\frac{3}{5}$	$\frac{5}{6}+\frac{5}{6}$	$\frac{1}{9}+\frac{2}{9}$	$3\frac{4}{5}+\frac{4}{5}$

Subtract the following. Reduce remainders.

7.	$6\frac{7}{8}$	$7\frac{5}{8}$	$5\frac{7}{8}$	$3\frac{4}{5}$	$6\frac{1}{6}$	$5\frac{4}{9}$	$5\frac{3}{10}$
	$\frac{3}{8}$	4	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{2}{9}$	$4\frac{1}{10}$
8.	$4\frac{5}{6}$	$8\frac{3}{5}$	$5\frac{9}{10}$	$4\frac{5}{9}$	$4\frac{5}{8}$	$6\frac{3}{4}$	$3\frac{1}{2}$
	$3\frac{1}{6}$	$3\frac{2}{5}$	$3\frac{3}{10}$	$2\frac{5}{9}$	$3\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$
9.	$4\frac{7}{12}$	$6\frac{7}{10}$	$5\frac{3}{8}$	$3\frac{7}{9}$	$2\frac{5}{8}$	$2\frac{3}{4}$	$6\frac{8}{9}$
	$3\frac{5}{12}$	$2\frac{3}{10}$	$\frac{1}{8}$	$3\frac{2}{9}$	$\frac{3}{8}$	$1\frac{3}{4}$	$2\frac{4}{9}$
10.	$6\frac{7}{10}$	$4\frac{5}{7}$	$6\frac{4}{5}$	$4\frac{2}{3}$	$6\frac{7}{8}$	$5\frac{8}{9}$	$5\frac{7}{16}$
	$5\frac{7}{10}$	$2\frac{3}{7}$	$\frac{3}{5}$	$3\frac{2}{3}$	$2\frac{3}{8}$	$4\frac{4}{9}$	$4\frac{5}{16}$
11.	$4\frac{8}{9}$	$5\frac{5}{6}$	$4\frac{7}{8}$	$7\frac{7}{9}$	$2\frac{5}{12}$	$4\frac{5}{8}$	$4\frac{8}{9}$
	$\frac{7}{9}$	$3\frac{5}{6}$	$\frac{5}{8}$	$3\frac{5}{9}$	$\frac{1}{12}$	$3\frac{5}{8}$	$\frac{1}{9}$

Problems

1. Alfred worked at a store $1\frac{1}{2}$ hours last week and $2\frac{1}{2}$ hours this week. How many hours did he work both weeks?

2. Joyce lives $\frac{3}{4}$ of a mile from school. How far does she walk in going to and from school?

Unit 19. Addition of Unlike Fractions

Adding Fractions with Different Denominators

1. Jerry had 3 nickels and 4 cents. How many cents did he have?

3 nickels	**= 15¢**
4 cents	**= 4¢**
	19¢

Change the three nickels to cents and then add. Jerry had 19¢.

2. Bob bought $\frac{1}{2}$ lb. of stick candy and $\frac{1}{4}$ lb. of jelly beans. How much candy did he buy?

$\frac{1}{2} = \frac{2}{4}$
$\frac{1}{4} = \frac{1}{4}$
$\frac{3}{4}$

You cannot add $\frac{1}{2}$ and $\frac{1}{4}$ until you change $\frac{1}{2}$ to fourths. To add $\frac{1}{2}$ and $\frac{1}{4}$, think $\frac{1}{2} = \frac{2}{4}$. Then $\frac{2}{4} + \frac{1}{4} = \frac{3}{4}$. Write $\frac{3}{4}$. He bought $\frac{3}{4}$ lb.

Fractions such as $\frac{1}{4}$ and $\frac{2}{4}$ are called **like fractions** because their denominators are alike. We say that such fractions have a **common denominator.** You can add like fractions without changing the denominators.

Fractions such as $\frac{1}{2}$ and $\frac{3}{8}$ are called **unlike fractions.** You cannot add unlike fractions until you have reduced them to a common denominator. To add $\frac{1}{2}$ and $\frac{3}{8}$, think $\frac{1}{2} = \frac{4}{8}$. Then think $\frac{4}{8} + \frac{3}{8} = \frac{7}{8}$. Eight is the **least common denominator** of $\frac{1}{2}$ and $\frac{3}{8}$.

3. Study the addition in each example below. The fractions having the smaller denominators are changed.

$\frac{1}{2} = \frac{4}{8}$
$\frac{1}{8} = \frac{1}{8}$
$\frac{5}{8}$

$\frac{1}{2} = \frac{4}{8}$
$\frac{3}{8} = \frac{3}{8}$
$\frac{7}{8}$

$\frac{1}{4} = \frac{2}{8}$
$\frac{1}{8} = \frac{1}{8}$
$\frac{3}{8}$

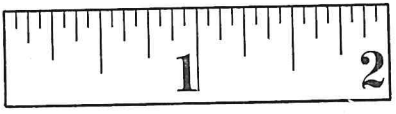
$\frac{2}{3} = \frac{4}{6}$
$\frac{1}{6} = \frac{1}{6}$
$\frac{5}{6}$

4. Add. Reduce answers to lowest terms.

$\frac{3}{4}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{3}$	$\frac{1}{6}$
$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{1}{2}$

Changing Fractions to Higher Terms

On most foot rulers each inch is divided into halves, fourths, eighths, and sixteenths.



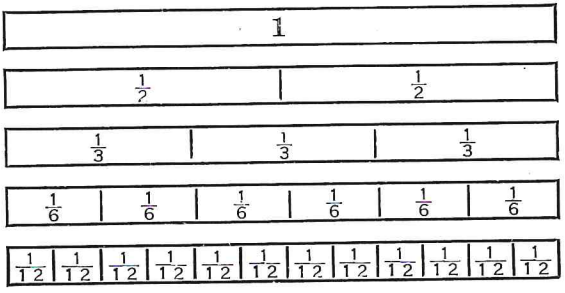
Use the ruler in changing the following fractions to higher terms. Find the missing numerators.

1. $\frac{1}{2}=\frac{\ }{4}$ $\frac{1}{2}=\frac{\ }{8}$ $\frac{1}{2}=\frac{\ }{16}$ $\frac{1}{4}=\frac{\ }{8}$ $\frac{2}{4}=\frac{\ }{8}$

2. $\frac{1}{4}=\frac{\ }{16}$ $\frac{3}{4}=\frac{\ }{8}$ $\frac{3}{4}=\frac{\ }{16}$ $\frac{1}{8}=\frac{\ }{16}$ $\frac{2}{4}=\frac{\ }{16}$

3. $\frac{3}{8}=\frac{\ }{16}$ $\frac{5}{8}=\frac{\ }{16}$ $\frac{7}{8}=\frac{\ }{16}$ $\frac{2}{2}=\frac{\ }{16}$ $\frac{6}{8}=\frac{\ }{16}$

To add unlike fractions, you must learn to change fractions to higher terms. Use the ruler, and the drawing at the right to help you change the following to higher terms:



4. $1=\frac{\ }{2}$

5. $1=\frac{\ }{6}$

6. $1=\frac{\ }{3}$ $\frac{1}{2}=\frac{\ }{12}$ $\frac{1}{3}=\frac{\ }{6}$ $\frac{1}{3}=\frac{\ }{12}$ $\frac{2}{3}=\frac{\ }{6}$

7. $1=\frac{\ }{12}$ $\frac{1}{6}=\frac{\ }{12}$ $\frac{2}{6}=\frac{\ }{12}$ $\frac{3}{6}=\frac{\ }{12}$ $\frac{5}{6}=\frac{\ }{12}$

8. $\frac{1}{2}=\frac{\ }{4}$ $\frac{1}{2}=\frac{\ }{8}$ $\frac{1}{2}=\frac{\ }{16}$ $\frac{1}{2}=\frac{\ }{6}$ $\frac{1}{2}=\frac{\ }{12}$

9. $\frac{1}{4}=\frac{\ }{8}$ $\frac{1}{4}=\frac{\ }{16}$ $\frac{1}{4}=\frac{\ }{12}$ $\frac{3}{4}=\frac{\ }{16}$ $\frac{3}{4}=\frac{\ }{12}$

10. $\frac{1}{8}=\frac{\ }{16}$ $\frac{3}{8}=\frac{\ }{16}$ $\frac{1}{3}=\frac{\ }{6}$ $\frac{1}{3}=\frac{\ }{12}$ $\frac{2}{3}=\frac{\ }{12}$

11. $\frac{3}{4}=\frac{\ }{8}$ $\frac{1}{6}=\frac{\ }{12}$ $\frac{5}{6}=\frac{\ }{12}$ $\frac{5}{8}=\frac{\ }{16}$ $\frac{7}{8}=\frac{\ }{16}$

Add the following. Reduce answers to lowest terms.

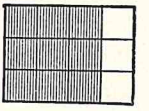
12. $\frac{1}{8}+\frac{1}{4}$ $\frac{1}{2}+\frac{1}{6}$ $\frac{1}{3}+\frac{1}{6}$ $\frac{1}{4}+\frac{3}{4}$ $\frac{1}{8}+\frac{3}{4}$

13. $\frac{1}{6}+\frac{2}{3}$ $\frac{1}{2}+\frac{1}{12}$ $\frac{1}{2}+\frac{1}{16}$ $\frac{1}{3}+\frac{1}{12}$ $\frac{1}{4}+\frac{1}{12}$

14. $\frac{1}{2}+\frac{3}{16}$ $\frac{1}{2}+\frac{5}{12}$ $\frac{1}{2}+\frac{5}{8}$ $\frac{1}{4}+\frac{3}{8}$ $\frac{1}{6}+\frac{1}{12}$

Changing Fractions to Higher or Lower Terms

You have learned to change $\frac{9}{12}$ to $\frac{3}{4}$ by dividing both terms of $\frac{9}{12}$ by 3. You can change $\frac{3}{4}$ back to $\frac{9}{12}$ by multiplying both terms of $\frac{3}{4}$ by 3. Thus, $\frac{3}{4} \times \frac{3}{3} = \frac{9}{12}$. To change a fraction to higher terms, multiply both terms of the fraction by the same number. Multiplying or dividing both terms of a fraction by the same number does not change the value of the fraction.



Sight Work

Change these fractions to higher terms:

1. $\frac{1}{2} = \frac{\quad}{4}$ $\frac{1}{2} = \frac{\quad}{6}$ $\frac{1}{2} = \frac{\quad}{8}$ $\frac{1}{2} = \frac{\quad}{10}$ $\frac{1}{2} = \frac{\quad}{12}$

2. $\frac{1}{2} = \frac{\quad}{14}$ $\frac{1}{2} = \frac{\quad}{16}$ $\frac{1}{2} = \frac{\quad}{18}$ $\frac{1}{2} = \frac{\quad}{20}$ $\frac{1}{2} = \frac{\quad}{24}$

3. $\frac{1}{3} = \frac{\quad}{6}$ $\frac{1}{3} = \frac{\quad}{9}$ $\frac{1}{3} = \frac{\quad}{12}$ $\frac{1}{3} = \frac{\quad}{15}$ $\frac{1}{3} = \frac{\quad}{18}$

4. $\frac{2}{3} = \frac{\quad}{6}$ $\frac{2}{3} = \frac{\quad}{9}$ $\frac{2}{3} = \frac{\quad}{12}$ $\frac{2}{3} = \frac{\quad}{15}$ $\frac{2}{3} = \frac{\quad}{24}$

5. $\frac{1}{4} = \frac{\quad}{8}$ $\frac{1}{4} = \frac{\quad}{12}$ $\frac{1}{4} = \frac{\quad}{16}$ $\frac{1}{4} = \frac{\quad}{20}$ $\frac{1}{4} = \frac{\quad}{24}$

6. $\frac{3}{4} = \frac{\quad}{8}$ $\frac{3}{4} = \frac{\quad}{12}$ $\frac{3}{4} = \frac{\quad}{16}$ $\frac{3}{4} = \frac{\quad}{20}$ $\frac{3}{4} = \frac{\quad}{24}$

7. $\frac{1}{5} = \frac{\quad}{10}$ $\frac{1}{5} = \frac{\quad}{15}$ $\frac{2}{5} = \frac{\quad}{10}$ $\frac{2}{5} = \frac{\quad}{15}$ $\frac{2}{5} = \frac{\quad}{20}$

8. $\frac{3}{5} = \frac{\quad}{10}$ $\frac{4}{5} = \frac{\quad}{10}$ $\frac{4}{5} = \frac{\quad}{15}$ $\frac{1}{8} = \frac{\quad}{16}$ $\frac{1}{8} = \frac{\quad}{24}$

9. $\frac{3}{8} = \frac{\quad}{16}$ $\frac{5}{8} = \frac{\quad}{16}$ $\frac{7}{8} = \frac{\quad}{16}$ $\frac{4}{5} = \frac{\quad}{20}$ $\frac{3}{8} = \frac{\quad}{24}$

10. $\frac{1}{6} = \frac{\quad}{12}$ $\frac{1}{6} = \frac{\quad}{18}$ $\frac{1}{6} = \frac{\quad}{24}$ $\frac{5}{6} = \frac{\quad}{12}$ $\frac{5}{12} = \frac{\quad}{24}$

Reduce the fractions below to lowest terms:

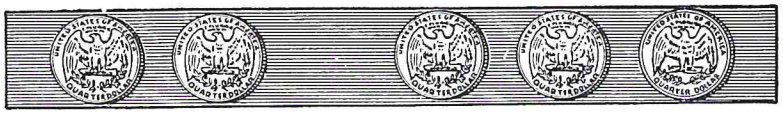
11. $\frac{6}{12}$ $\frac{8}{16}$ $\frac{4}{6}$ $\frac{6}{10}$ $\frac{3}{9}$ $\frac{7}{14}$ $\frac{6}{8}$ $\frac{8}{24}$

12. $\frac{4}{8}$ $\frac{3}{15}$ $\frac{8}{12}$ $\frac{4}{16}$ $\frac{3}{18}$ $\frac{5}{20}$ $\frac{18}{24}$ $\frac{2}{12}$

13. $\frac{6}{18}$ $\frac{12}{16}$ $\frac{10}{12}$ $\frac{9}{24}$ $\frac{6}{9}$ $\frac{4}{12}$ $\frac{10}{15}$ $\frac{15}{20}$

14. $\frac{2}{16}$ $\frac{9}{15}$ $\frac{16}{24}$ $\frac{3}{12}$ $\frac{6}{20}$ $\frac{8}{10}$ $\frac{10}{30}$ $\frac{2}{18}$

Adding Unlike Fractions



1. One half dollar and three quarter dollars are how many dollars?

$\frac{1}{2} = \frac{2}{4}$
$\frac{3}{4} = \frac{3}{4}$
$\frac{5}{4} = 1\frac{1}{4}$

Add $\frac{1}{2}$ and $\frac{3}{4}$. Before adding, $\frac{1}{2}$ must be changed to fourths. Think $\frac{1}{2} = \frac{2}{4}$. Write $\frac{2}{4}$ and $\frac{3}{4}$ as shown. Think $\frac{2}{4} + \frac{3}{4} = \frac{5}{4}$. Write $\frac{5}{4}$. Change $\frac{5}{4}$ to $1\frac{1}{4}$. The answer is \$1.25.

2. One tenth of a farmer's land was planted in oats and $\frac{1}{2}$ in wheat. What part was planted in both oats and wheat?

$\frac{1}{10} = \frac{1}{10}$
$\frac{1}{2} = \frac{5}{10}$
$\frac{6}{10} = \frac{3}{5}$

Add $\frac{1}{10}$ and $\frac{1}{2}$. Think $\frac{1}{2} = \frac{5}{10}$. Write the fractions $\frac{1}{10}$ and $\frac{5}{10}$ as shown. Think $\frac{1}{10} + \frac{5}{10} = \frac{6}{10}$. Write $\frac{6}{10}$. Change $\frac{6}{10}$ to $\frac{3}{5}$. The answer is $\frac{3}{5}$.

Add the fractions below:

3.

$\frac{1}{2} = \frac{3}{6}$	$\frac{1}{4} = \frac{2}{8}$	$\frac{1}{3} = \frac{2}{6}$	$\frac{2}{3} = \frac{4}{6}$
$\frac{1}{6} = \frac{1}{6}$	$\frac{7}{8} = \frac{7}{8}$	$\frac{1}{6} = \frac{1}{6}$	$\frac{5}{6} = \frac{5}{6}$
$\frac{4}{6} = \frac{2}{3}$	$\frac{9}{8} = 1\frac{1}{8}$	$\frac{3}{6} = \frac{1}{2}$	$\frac{9}{6} = 1\frac{1}{2}$

4.

$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{2}{9}$	$\frac{1}{10}$	$\frac{1}{2}$	$\frac{5}{12}$	$\frac{1}{2}$
$\frac{5}{6}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{7}{10}$	$\frac{1}{3}$	$\frac{7}{8}$

5.

$\frac{1}{16}$	$\frac{1}{2}$	$\frac{4}{5}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{4}{9}$
$\frac{1}{2}$	$\frac{7}{12}$	$\frac{4}{5}$	$\frac{5}{8}$	$\frac{11}{12}$	$\frac{3}{8}$	$\frac{7}{9}$	$\frac{1}{3}$

6.

$\frac{3}{4}$	$\frac{5}{8}$	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{1}{2}$
$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{15}$	$\frac{1}{3}$	$\frac{5}{12}$	$\frac{3}{4}$	$\frac{5}{12}$	$\frac{5}{12}$

7.

$\frac{1}{2}$	$\frac{3}{8}$	$\frac{5}{6}$	$\frac{5}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{7}{8}$	$\frac{5}{6}$
$\frac{1}{10}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{1}{16}$	$\frac{15}{16}$	$\frac{1}{2}$	$\frac{5}{12}$

A Table of Least Common Denominators

Finding the **least common denominator** (l.c.d.) is the first step in adding or subtracting unlike fractions.

The chart below will help you find the least common denominators that are most commonly used in addition or subtraction of fractions. Refer to this chart until you have become thoroughly familiar with it.

To find the least common denominator of $\frac{1}{2}$ and $\frac{1}{3}$, for example, look for the first column that contains fractions for both halves and thirds. You will find the column headed 6. In the column you see that $\frac{1}{2}=\frac{3}{6}$, and $\frac{1}{3}=\frac{2}{6}$. The least common denominator is 6.

Fractions	Common Denominators										
	4	6	8	9	10	12	15	16	18	20	24
$\frac{1}{2}$	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{4}{8}$		$\frac{5}{10}$	$\frac{6}{12}$		$\frac{8}{16}$	$\frac{9}{18}$	$\frac{10}{20}$	$\frac{12}{24}$
$\frac{1}{3}$		$\frac{2}{6}$		$\frac{3}{9}$		$\frac{4}{12}$	$\frac{5}{15}$		$\frac{6}{18}$		$\frac{8}{24}$
$\frac{1}{4}$	$\frac{1}{4}$		$\frac{2}{8}$			$\frac{3}{12}$		$\frac{4}{16}$		$\frac{5}{20}$	$\frac{6}{24}$
$\frac{1}{5}$					$\frac{2}{10}$		$\frac{3}{15}$			$\frac{4}{20}$	
$\frac{1}{6}$		$\frac{1}{6}$				$\frac{2}{12}$			$\frac{3}{18}$		$\frac{4}{24}$
$\frac{1}{8}$			$\frac{1}{8}$					$\frac{2}{16}$			$\frac{3}{24}$
$\frac{1}{9}$				$\frac{1}{9}$					$\frac{2}{18}$		
$\frac{1}{10}$					$\frac{1}{10}$					$\frac{2}{20}$	
$\frac{1}{12}$						$\frac{1}{12}$					$\frac{2}{24}$

Find the l.c.d. for each group below. Then add:

1. $\frac{1}{2}\ \frac{1}{5}$ $\frac{1}{4}\ \frac{1}{10}$ $\frac{1}{3}\ \frac{1}{9}$ $\frac{1}{3}\ \frac{1}{4}$ $\frac{1}{3}\ \frac{1}{5}$ $\frac{1}{3}\ \frac{1}{8}$

2. $\frac{1}{4}\ \frac{1}{6}$ $\frac{1}{6}\ \frac{1}{8}$ $\frac{1}{2}\ \frac{1}{12}$ $\frac{1}{3}\ \frac{1}{12}$ $\frac{1}{8}\ \frac{1}{12}$ $\frac{1}{6}\ \frac{1}{12}$

3. $\frac{2}{3}\ \frac{3}{4}\ \frac{1}{2}$ $\frac{5}{12}\ \frac{1}{8}\ \frac{2}{3}$ $\frac{1}{6}\ \frac{2}{3}\ \frac{1}{4}$ $\frac{1}{4}\ \frac{1}{2}\ \frac{3}{8}$

Adding Unlike Fractions

1. What is the sum of $\frac{2}{3}$ of a year and $\frac{5}{12}$ of a year?

Add $\frac{2}{3}$ and $\frac{5}{12}$. The least common denominator of thirds and twelfths is 12. Think $\frac{2}{3} = \frac{8}{12}$. Write the fractions $\frac{8}{12}$ and $\frac{5}{12}$ as shown. Think $\frac{8}{12} + \frac{5}{12} = \frac{13}{12}$. Write $\frac{13}{12}$. Think $\frac{13}{12} = 1\frac{1}{12}$. The answer is $1\frac{1}{12}$ years.

$$\frac{2}{3} = \frac{8}{12}$$
$$\frac{5}{12} = \frac{5}{12}$$
$$\frac{13}{12} = 1\frac{1}{12}$$

Add the following fractions:

2.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{7}{9}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{5}{8}$
$\frac{11}{16}$	$\frac{11}{12}$	$\frac{8}{9}$	$\frac{13}{16}$	$\frac{2}{3}$	$\frac{11}{12}$	$\frac{9}{16}$	$\frac{7}{16}$

3.

$\frac{2}{3}$	$\frac{2}{5}$	$\frac{2}{3}$	$\frac{9}{10}$	$\frac{1}{5}$	$\frac{2}{3}$	$\frac{8}{9}$	$\frac{9}{16}$
$\frac{5}{9}$	$\frac{9}{10}$	$\frac{7}{15}$	$\frac{1}{5}$	$\frac{9}{10}$	$\frac{11}{12}$	$\frac{2}{3}$	$\frac{1}{2}$

4.

$\frac{2}{3}$	$\frac{8}{9}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{3}$
$\frac{7}{15}$	$\frac{1}{3}$	$\frac{13}{16}$	$\frac{15}{16}$	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{13}{16}$	$\frac{11}{15}$

5.

$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{5}{8}$	$\frac{3}{8}$
$\frac{9}{16}$	$\frac{11}{16}$	$\frac{15}{16}$	$\frac{15}{16}$	$\frac{5}{16}$	$\frac{1}{4}$	$\frac{9}{16}$	$\frac{15}{16}$

Problems

1. Mr. Wilson drove his car $97\frac{3}{10}$ miles on Friday and $101\frac{9}{10}$ miles on Saturday. How far did he drive?

2. At 25¢ a square foot, what will it cost to build a walk 4 feet wide and 84 feet long?

3. Using $\frac{7}{8}$ yd. of linen for each towel, how many yards of linen will Edith need for 2 towels?

4. Alfred worked $3\frac{1}{2}$ hours on Monday and $5\frac{3}{4}$ hours on Saturday. At 20¢ an hour, how much did he earn?

5. From a board $8\frac{3}{4}$ ft. long, a piece $2\frac{1}{4}$ ft. was cut off. How long was the piece remaining?

Unit 20. Addition and Subtraction of Unlike Fractions

Addition of Unlike Fractions

1. Ed lives $\frac{1}{2}$ mi. from a gas station. The garage is $\frac{7}{10}$ mi. farther. How far is his home from the garage?

Add $\frac{1}{2}$ and $\frac{7}{10}$.

$\frac{1}{2} = \frac{5}{10}$
$\frac{7}{10} = \frac{7}{10}$
$\frac{12}{10} = 1\frac{1}{5}$

Step 1. Find the least common denominator of halves and tenths.

Step 2. Think $\frac{1}{2} = \frac{5}{10}$. Write $\frac{5}{10}$ and $\frac{7}{10}$.

Step 3. Think $\frac{5}{10} + \frac{7}{10}$. Write $\frac{12}{10}$. Think $\frac{12}{10} = 1\frac{2}{10} = 1\frac{1}{5}$. The answer is $1\frac{1}{5}$ miles.

Add the following fractions:

2.	$\frac{1}{4}$	$\frac{11}{12}$	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{1}{2}$	$\frac{3}{4}$
	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{5}{12}$	$\frac{5}{12}$	$\frac{1}{2}$	$\frac{9}{10}$	$\frac{11}{12}$
3.	$\frac{2}{5}$	$\frac{1}{3}$	$\frac{9}{10}$	$\frac{2}{3}$	$\frac{13}{15}$	$\frac{2}{3}$	$\frac{5}{12}$	$\frac{11}{12}$
	$\frac{14}{15}$	$\frac{13}{15}$	$\frac{3}{5}$	$\frac{8}{15}$	$\frac{4}{5}$	$\frac{11}{15}$	$\frac{3}{4}$	$\frac{1}{3}$
4.	$\frac{3}{4}$	$\frac{8}{15}$	$\frac{3}{5}$	$\frac{9}{10}$	$\frac{7}{10}$	$\frac{7}{12}$	$\frac{11}{15}$	$\frac{11}{12}$
	$\frac{7}{12}$	$\frac{4}{5}$	$\frac{9}{10}$	$\frac{1}{2}$	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{1}{4}$
5.	$\frac{3}{5}$	$\frac{7}{10}$	$\frac{13}{15}$	$\frac{4}{5}$	$\frac{5}{12}$	$\frac{11}{15}$	$\frac{7}{12}$	$\frac{8}{15}$
	$\frac{11}{15}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{8}{15}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{2}{3}$
6.	$\frac{1}{2}$	$\frac{5}{16}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{8}$	$\frac{5}{8}$	$\frac{1}{5}$	$\frac{1}{8}$
	$\frac{11}{12}$	$\frac{1}{4}$	$\frac{5}{9}$	$\frac{7}{10}$	$\frac{3}{16}$	$\frac{1}{2}$	$\frac{1}{20}$	$\frac{13}{16}$
7.	$\frac{4}{5}$	$\frac{1}{3}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{7}{8}$	$\frac{2}{5}$	$\frac{2}{3}$	$\frac{3}{8}$
	$\frac{9}{10}$	$\frac{5}{12}$	$\frac{3}{10}$	$\frac{9}{10}$	$\frac{3}{4}$	$\frac{3}{20}$	$\frac{5}{6}$	$\frac{5}{16}$

Addition of Fractions

1. How many dollars do $\frac{3}{4}$ and $\frac{9}{20}$ of a dollar equal?

Add $\frac{3}{4}$ and $\frac{9}{20}$. The finished work is shown below: Give each step. Think $\frac{24}{20} = 1\frac{4}{20} = 1\frac{1}{5}$. Then write the answer, $1\frac{1}{5}$, as shown. Copy the example and work it without looking at the book.

$$\frac{3}{4} = \frac{15}{20}$$
$$\frac{9}{20} = \frac{9}{20}$$
$$\frac{24}{20} = 1\frac{1}{5}$$

Add the fractions below:

2.	$\frac{3}{4}$	$\frac{7}{12}$	$\frac{7}{8}$	$\frac{5}{9}$	$\frac{3}{8}$	$\frac{5}{6}$	$\frac{7}{12}$	$\frac{1}{4}$
	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{2}{3}$	$\frac{1}{16}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{7}{20}$
3.	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{11}{16}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{5}$
	$\frac{9}{16}$	$\frac{5}{16}$	$\frac{5}{12}$	$\frac{15}{16}$	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{5}{12}$	$\frac{4}{5}$
4.	$\frac{5}{12}$	$\frac{11}{12}$	$\frac{7}{16}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{4}{5}$
	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{9}{16}$	$\frac{11}{16}$	$\frac{3}{20}$	$\frac{7}{8}$	$\frac{13}{16}$	$\frac{7}{20}$

Problems

1. In making candy, Edith used $1\frac{1}{2}$ cups of brown sugar and $2\frac{3}{4}$ cups of white sugar. How much sugar did she use?

2. Jim caught one fish that weighed $\frac{7}{8}$ lb. and another that weighed $\frac{3}{4}$ lb. How much did both fish weigh?

3. Martha weighed $56\frac{1}{4}$ lb. in April and $58\frac{3}{4}$ lb. in October. How much did she gain?

4. At a speed of 56 miles per hour, how far will a train travel in $5\frac{1}{2}$ hours?

5. A board $\frac{7}{8}$ in. thick is nailed to a plank $1\frac{3}{4}$ in. thick. How thick are the two nailed together?

6. On Monday Martha bought $1\frac{1}{2}$ lb. of meat and on Tuesday $1\frac{3}{4}$ lb. How much did she buy in the two days?

Addition and Subtraction of Fractions

Add these fractions:

1.	$\frac{3}{4}$	$\frac{5}{12}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$
	$\frac{1}{12}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{11}{12}$	$\frac{5}{6}$	$\frac{5}{8}$	$\frac{7}{12}$	$\frac{7}{12}$
2.	$\frac{5}{12}$	$\frac{1}{8}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{5}{6}$	$\frac{4}{5}$	$\frac{2}{3}$
	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{4}{9}$	$\frac{3}{8}$	$\frac{5}{16}$	$\frac{7}{12}$	$\frac{3}{10}$	$\frac{5}{12}$

Subtract the following:

3.	$6\frac{5}{6}$	$8\frac{7}{10}$	$7\frac{5}{8}$	$3\frac{2}{3}$	$7\frac{5}{12}$	$9\frac{7}{8}$	$8\frac{3}{16}$
	$2\frac{1}{6}$	$4\frac{1}{10}$	$3\frac{3}{8}$	$1\frac{1}{3}$	$3\frac{1}{12}$	$8\frac{1}{8}$	$2\frac{1}{16}$
4.	$7\frac{7}{16}$	$5\frac{7}{8}$	$9\frac{11}{16}$	$6\frac{7}{12}$	$8\frac{9}{16}$	$4\frac{11}{12}$	$7\frac{9}{10}$
	$3\frac{3}{16}$	$4\frac{3}{8}$	$2\frac{3}{16}$	$5\frac{5}{12}$	$6\frac{3}{16}$	$2\frac{1}{12}$	$3\frac{3}{10}$

Problems

1. Margaret's baby sister gained $\frac{5}{8}$ lb. one week and $\frac{3}{4}$ lb. the next. How many pounds did she gain in all?

2. Joyce practiced her music lesson $\frac{1}{2}$ hr. yesterday and $\frac{3}{4}$ hr. today. How long did she practice?

3. Ed caught one fish $10\frac{7}{8}$ in. long and another $10\frac{1}{8}$ in. long. What was the difference in length?

4. Jerry walked $\frac{5}{8}$ of a mile to the grocery store and $\frac{1}{4}$ of a mile more in the same direction to the library. How far did he walk in all?

5. Violet bought $\frac{1}{2}$ doz. oranges and Lucy $\frac{5}{6}$ doz. How many dozen did they both buy? how many oranges?

6. Edith's mother bought two chickens weighing $3\frac{7}{8}$ lb. and $4\frac{1}{8}$ lb. What was the weight of both?

Subtraction of Unlike Fractions

1. Helen practiced her piano lesson for $\frac{1}{4}$ hr., Mary for $\frac{1}{2}$ hr. How much longer did Mary practice?

$$\frac{1}{2}=\frac{2}{4}$$
$$\frac{1}{4}=\frac{1}{4}$$
$$\frac{1}{4}$$

Subtract $\frac{1}{4}$ from $\frac{1}{2}$. You cannot subtract unlike fractions until you reduce them to a common denominator. Think $\frac{1}{2}=\frac{2}{4}$. Then write the fractions $\frac{2}{4}$ and $\frac{1}{4}$ as shown. Think $\frac{2}{4}-\frac{1}{4}=\frac{1}{4}$. Proof: $\frac{1}{4}+\frac{1}{4}=\frac{1}{2}$.

2. Subtract $\frac{1}{4}$ from $\frac{5}{12}$.

$$\frac{5}{12}=\frac{5}{12}$$
$$\frac{1}{4}=\frac{3}{12}$$
$$\frac{2}{12}=\frac{1}{6}$$

Think $\frac{1}{4}=\frac{3}{12}$. Write $\frac{5}{12}$ and $\frac{3}{12}$ as shown.

Think $\frac{5}{12}-\frac{3}{12}=\frac{2}{12}=\frac{1}{6}$. Proof: $\frac{1}{6}+\frac{1}{4}=\frac{5}{12}$.

Subtract the following. Reduce remainders to lowest terms.

3.

$\frac{1}{2}=\frac{4}{8}$	$\frac{2}{3}=\frac{4}{6}$	$\frac{4}{5}=\frac{8}{10}$	$\frac{7}{9}=\frac{7}{9}$
$\frac{3}{8}=\frac{3}{8}$	$\frac{1}{6}=\frac{1}{6}$	$\frac{3}{10}=\frac{3}{10}$	$\frac{1}{3}=\frac{3}{9}$
$\frac{1}{8}$	$\frac{3}{6}=\frac{1}{2}$	$\frac{5}{10}=\frac{1}{2}$	$\frac{4}{9}$

4.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{7}{8}$
$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{2}$

5.

$\frac{5}{6}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{9}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{1}{3}$
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{9}$

6.

$\frac{3}{4}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{1}{2}$
$\frac{5}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{1}{16}$	$\frac{1}{9}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{12}$

7.

$\frac{5}{12}$	$\frac{1}{6}$	$\frac{7}{12}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{5}{12}$	$\frac{5}{6}$
$\frac{1}{3}$	$\frac{1}{12}$	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{6}$	$\frac{1}{12}$

8.

$\frac{3}{4}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{3}{8}$	$\frac{7}{10}$	$\frac{7}{8}$	$\frac{1}{3}$
$\frac{5}{12}$	$\frac{1}{16}$	$\frac{5}{12}$	$\frac{2}{9}$	$\frac{3}{16}$	$\frac{2}{5}$	$\frac{5}{16}$	$\frac{1}{15}$

Subtraction of Mixed Numbers

1. A piece of cloth measured $7\frac{5}{6}$ yd. After $5\frac{1}{3}$ yd. were cut off, how much cloth remained?

Subtract $5\frac{1}{3}$ from $7\frac{5}{6}$. Change $\frac{1}{3}$ to $\frac{2}{6}$. Write $7\frac{5}{6}$ and $5\frac{2}{6}$. Think $\frac{5}{6}-\frac{2}{6}=\frac{3}{6}$. Think $7-5$. Write 2. Think $2\frac{3}{6}=2\frac{1}{2}$.

$$7\tfrac{5}{6}=7\tfrac{5}{6}$$
$$5\tfrac{1}{3}=5\tfrac{2}{6}$$
$$2\tfrac{3}{6}=2\tfrac{1}{2}$$

Subtract the numbers below:

2.

$6\frac{1}{2}$	$8\frac{1}{2}$	$8\frac{3}{4}$	$5\frac{5}{6}$	$7\frac{3}{8}$	$4\frac{1}{2}$	$9\frac{1}{2}$
$4\frac{1}{4}$	$2\frac{1}{6}$	$2\frac{1}{2}$	$3\frac{2}{3}$	$2\frac{1}{4}$	$4\frac{1}{6}$	$2\frac{3}{8}$

3.

$5\frac{7}{8}$	$9\frac{5}{8}$	$8\frac{9}{10}$	$4\frac{5}{8}$	$7\frac{5}{6}$	$4\frac{1}{2}$	$6\frac{3}{16}$
$2\frac{1}{4}$	$5\frac{9}{16}$	$2\frac{1}{2}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$3\frac{3}{10}$	$\frac{1}{8}$

4.

$4\frac{3}{4}$	$9\frac{3}{10}$	$7\frac{3}{4}$	$6\frac{5}{12}$	$7\frac{9}{16}$	$6\frac{4}{5}$	$2\frac{1}{2}$
$2\frac{7}{12}$	$3\frac{1}{5}$	$5\frac{5}{16}$	$3\frac{1}{3}$	$4\frac{1}{2}$	$5\frac{7}{10}$	$1\frac{1}{12}$

5.

$9\frac{7}{16}$	$8\frac{1}{4}$	$6\frac{5}{6}$	$7\frac{1}{8}$	$9\frac{1}{2}$	$3\frac{3}{4}$	$5\frac{7}{8}$
$7\frac{3}{8}$	$6\frac{3}{16}$	$3\frac{5}{12}$	$4\frac{1}{16}$	$8\frac{5}{12}$	$1\frac{3}{16}$	$3\frac{7}{16}$

6.

$4\frac{5}{6}$	$5\frac{2}{3}$	$6\frac{3}{4}$	$8\frac{7}{8}$	$9\frac{5}{12}$	$5\frac{7}{8}$	$7\frac{3}{4}$
$3\frac{2}{3}$	$3\frac{1}{6}$	$2\frac{1}{16}$	$3\frac{3}{4}$	$2\frac{1}{3}$	$2\frac{1}{2}$	$4\frac{2}{3}$

Give the sums of the following:

7.

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{6}$
$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

8.

$\frac{1}{2}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$
$\frac{3}{4}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{5}{6}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{8}{9}$	$\frac{7}{12}$

9. Count by $\frac{1}{6}$'s to 3: $\frac{1}{6}$, $\frac{1}{3}$, $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{6}$, 1, $1\frac{1}{6}$, etc.

10. Count by $\frac{1}{4}$'s to 4: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, etc.

Sight Problems

1. Jerry is $54\frac{3}{4}$ inches tall, and Walter is $52\frac{1}{2}$ inches tall. How much taller is Jerry?

2. Alfred caught two trout weighing $1\frac{1}{4}$ lb. and $1\frac{3}{4}$ lb. How much did his two fish weigh?

3. Louis rode his bicycle $6\frac{3}{4}$ miles in the forenoon and $7\frac{3}{4}$ miles in the afternoon. How far did he ride?

4. At the rate of 3 bars for 10¢, what is the price of one chocolate bar? (Since the clerk cannot give change for a fraction of a cent, the price charged would be the next higher cent.)

5. Find the lowest terms of $\frac{2}{4}$, $\frac{6}{8}$, $\frac{6}{9}$, $\frac{2}{6}$, and $\frac{4}{8}$.

6. What is the area of a floor that is 15 feet wide and 20 feet long?

7. At 2 cans for 35¢, what do 8 cans of cherries cost?

8. At 40¢ a dozen, what is the cost of $3\frac{1}{2}$ dozen eggs?

9. At a speed of 40 miles an hour, how long will it take a train to run 280 miles?

10. A year ago Harold was $51\frac{3}{8}$ inches tall. Now he is $52\frac{7}{8}$ inches tall. How much did he grow in 1 year?

11. Mildred began at 2 P.M. and practiced $1\frac{1}{4}$ hours. At what time did she finish her practice?

12. Jerry takes 15 minutes to walk to school. What part of an hour does he take?

13. A small ham weighed $7\frac{3}{8}$ pounds and another weighed $5\frac{1}{8}$ pounds. What was the weight of both hams?

14. Mildred's mother bought $3\frac{3}{8}$ yd. of linen and $2\frac{1}{4}$ yd. of cotton goods. How many yards did she buy?

Fifth Self-Test

Test in Fractions

Reduce each fraction to lowest terms:

1. $\frac{4}{8}$ $\frac{3}{9}$ $\frac{2}{8}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{4}{12}$ $\frac{3}{12}$ $\frac{6}{12}$ $\frac{2}{12}$

2. $\frac{8}{10}$ $\frac{4}{16}$ $\frac{14}{16}$ $\frac{6}{9}$ $\frac{6}{15}$ $\frac{6}{18}$ $\frac{4}{20}$ $\frac{5}{20}$ $\frac{8}{24}$

Change the following to whole or mixed numbers:

3. $\frac{9}{9}$ $\frac{9}{3}$ $\frac{9}{6}$ $\frac{8}{2}$ $\frac{8}{4}$ $\frac{6}{4}$ $\frac{15}{10}$ $\frac{7}{2}$ $\frac{14}{3}$

4. $\frac{14}{4}$ $\frac{10}{6}$ $\frac{9}{2}$ $\frac{9}{4}$ $\frac{8}{3}$ $\frac{18}{16}$ $\frac{14}{12}$ $\frac{32}{16}$ $\frac{11}{6}$

Find the answers. Watch the signs.

5. $\frac{1}{2}+\frac{1}{8}$ $\frac{3}{4}-\frac{1}{4}$ $\frac{1}{4}+\frac{3}{8}$ $\frac{1}{2}-\frac{3}{8}$ $\frac{1}{5}+\frac{1}{10}$

6. $\frac{1}{6}+\frac{1}{12}$ $\frac{2}{3}-\frac{1}{2}$ $\frac{1}{8}+\frac{9}{16}$ $\frac{3}{4}-\frac{1}{2}$ $\frac{1}{2}+\frac{1}{6}$

7. $\frac{2}{5}+\frac{1}{10}$ $\frac{1}{2}-\frac{1}{6}$ $\frac{3}{4}+\frac{1}{2}$ $\frac{5}{8}-\frac{1}{4}$ $\frac{1}{2}+\frac{5}{8}$

8. $\frac{1}{3}+\frac{7}{9}$ $\frac{2}{3}-\frac{1}{6}$ $\frac{2}{3}+\frac{1}{6}$ $\frac{7}{8}-\frac{3}{4}$ $\frac{1}{4}+\frac{7}{16}$

9. $\frac{1}{5}+\frac{7}{10}$ $\frac{7}{10}-\frac{1}{2}$ $\frac{1}{2}+\frac{11}{16}$ $\frac{5}{6}-\frac{2}{3}$ $\frac{3}{4}+\frac{3}{4}$

Mixed Test

Find the answers. Watch the signs.

1.

\$6.07	\$20.63	\$317.18	\$4041.26	\$1.76
−1.75	−17.85	−69.89	−1875.89	−.95

2. \$106.72 + \$86.05 + \$.74 + \$873.55 + \$1756.25

3. \$605.95 × 24 \$7530.12 ÷ 78 \$836.49 − \$87.45

4.

797	519	634	862	489	837
822	756	308	276	993	560
687	946	876	548	452	699
236	685	476	545	438	847
892	986	714	217	885	798
479	874	969	789	674	986

Problem Test

1. Louis' father bought a radio for \$165. He paid \$55 cash and the balance at \$10 a month. How many months did it take him to pay for the radio?

2. Walter had \$8.65 and earned \$14.20. How much more money did he need to pay for a bicycle costing \$32?

3. A man earns 75¢ an hour. How much does he earn in 86 days, working 8 hours per day?

4. Jim's father paid \$125 an acre for 40 A. and \$3280 for a house. What did both cost?

5. A farmer sold 560 bu. of potatoes at \$2 a bushel. After paying \$892 for an auto, how much money did he have left from the sale of his potatoes?

6. An airplane flew 2944 miles in 16 hours. What was the average rate of speed?

7. Jerry and Harold walked $8\frac{3}{4}$ miles one day and $4\frac{3}{8}$ miles the next. How far did they walk in the two days?

8. Mr. Allen bought 8 tons of coal at \$6.50 a ton and paid 40¢ a ton to have it put in the basement. What was the total cost of his fuel?

9. A man sawed a board 16 ft. long into 6 pieces of equal length. What was the length of each piece?

10. Find the gain on 8 bushels of peaches bought for \$1.50 a bushel and sold at 55¢ a peck.

11. Henry bought 3 ties at 45¢ each. What was his change from \$2?

12. From a bolt of cloth containing $11\frac{3}{4}$ yd., $3\frac{3}{8}$ yd. were cut off. How much cloth was left?

13. Reduce $\frac{4}{6}$, $\frac{6}{9}$, and $\frac{8}{12}$ to their lowest terms.

Unit 21. Addition and Subtraction of Fractions

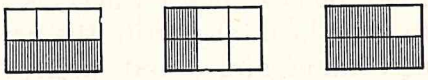
Addition of Fractions

1. Edith needs $\frac{1}{2}$ yd. of lace for sleeves and $\frac{1}{3}$ yd. for a collar. How much does she need?

Add $\frac{1}{2}$ and $\frac{1}{3}$. Find the l.c.d. of halves and thirds. The smallest number that can be divided by both 2 and 3 is 6. Think $\frac{1}{2}=\frac{3}{6}$ and $\frac{1}{3}=\frac{2}{6}$. Think $\frac{3}{6}+\frac{2}{6}=\frac{5}{6}$.

$$\frac{1}{2}=\frac{3}{6}$$
$$\frac{1}{3}=\frac{2}{6}$$
$$\frac{5}{6}$$

Draw rectangles to show that $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$.



2. Add $\frac{1}{3}$ and $\frac{1}{4}$.

Think the l.c.d. is 12. Change $\frac{1}{3}$ to $\frac{4}{12}$. Write $\frac{4}{12}$. Change $\frac{1}{4}$ to $\frac{3}{12}$. Write $\frac{3}{12}$. Think $\frac{4}{12}+\frac{3}{12}=\frac{7}{12}$. Write the sum, $\frac{7}{12}$.

$$\frac{1}{3}=\frac{4}{12}$$
$$\frac{1}{4}=\frac{3}{12}$$
$$\frac{7}{12}$$

The least common denominator (l.c.d.) of two or more fractions is the smallest number that can be divided exactly by each of their denominators.

Add these fractions:

3.

$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{5}{6}$
$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{2}{3}$

4.

$\frac{2}{3}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{4}$
$\frac{2}{5}$	$\frac{1}{6}$	$\frac{9}{16}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{15}{16}$

5.

$\frac{1}{2}$	$\frac{7}{10}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{1}{2}$
$\frac{3}{10}$	$\frac{2}{5}$	$\frac{5}{8}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{2}{5}$

6.

$\frac{2}{5}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{7}{10}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{1}{4}$
$\frac{3}{10}$	$\frac{5}{12}$	$\frac{2}{9}$	$\frac{7}{12}$	$\frac{4}{5}$	$\frac{13}{16}$	$\frac{3}{16}$	$\frac{11}{12}$

Addition of Fractions

1. Lucy bought $\frac{1}{4}$ yd. of cloth in one piece and $\frac{1}{6}$ yd. in another. How much cloth did she buy?

$\frac{1}{4} = \frac{3}{12}$
$\frac{1}{6} = \frac{2}{12}$
$\frac{5}{12}$

Step 1. The l.c.d. of fourths and sixths is 12.

Step 2. Think $\frac{1}{4} = \frac{3}{12}$ and $\frac{1}{6} = \frac{2}{12}$. Write $\frac{3}{12}$ and $\frac{2}{12}$.

Step 3. Add $\frac{3}{12}$ and $\frac{2}{12}$. Write $\frac{5}{12}$. Lucy bought $\frac{5}{12}$ yd.

The steps in the addition of unlike fractions are: (1) Find the l.c.d. of the fractions. (2) Reduce the fractions to their l.c.d. and write the new fractions. (3) Add the new numerators, and write the sum over the l.c.d. Reduce the sum to its simplest form.

Add the numbers below:

2.

$\frac{1}{4} = \frac{5}{20}$	$\frac{3}{8} = \frac{9}{24}$	$\frac{5}{6} = \frac{20}{24}$	$\frac{5}{8} = \frac{15}{24}$
$\frac{2}{5} = \frac{8}{20}$	$\frac{2}{3} = \frac{16}{24}$	$\frac{3}{8} = \frac{9}{24}$	$\frac{5}{12} = \frac{10}{24}$
$\frac{13}{20}$	$\frac{25}{24} = 1\frac{1}{24}$	$\frac{29}{24} = 1\frac{5}{24}$	$\frac{25}{24} = 1\frac{1}{24}$

3.

$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{1}{5}$	$\frac{1}{6}$	$\frac{2}{5}$	$\frac{5}{6}$	$\frac{5}{8}$
$\frac{1}{4}$	$\frac{1}{5}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{12}$

4.

$\frac{2}{5}$	$\frac{3}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{7}{8}$	$\frac{2}{3}$
$\frac{3}{4}$	$\frac{1}{6}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{4}{5}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{7}{9}$

5.

$\frac{3}{4}$	$\frac{2}{3}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{4}{5}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{5}{6}$
$\frac{2}{3}$	$\frac{4}{5}$	$\frac{5}{6}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{3}{5}$	$\frac{5}{6}$	$\frac{3}{4}$

6.

$\frac{4}{5}$	$\frac{1}{8}$	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{1}{3}$	$\frac{7}{8}$	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{5}{8}$
$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{8}$	$\frac{2}{3}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{2}{3}$	$\frac{7}{16}$

7.

$5\frac{3}{8}$	$4\frac{3}{4}$	$6\frac{4}{5}$	$8\frac{7}{12}$	$3\frac{3}{4}$	$5\frac{5}{8}$	$6\frac{5}{12}$
$\frac{5}{12}$	$4\frac{7}{16}$	$9\frac{3}{4}$	$8\frac{5}{8}$	$7\frac{2}{3}$	$6\frac{9}{16}$	$3\frac{2}{3}$

Practice in Adding Fractions

1.	$\frac{1}{3}$	$\frac{3}{10}$	$\frac{5}{6}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{3}$
	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{1}{12}$	$\frac{9}{10}$	$\frac{7}{8}$
2.	$\frac{1}{8}$	$\frac{1}{3}$	$\frac{3}{5}$	$\frac{3}{4}$	$\frac{9}{10}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{1}{6}$
	$\frac{1}{6}$	$\frac{3}{5}$	$\frac{9}{10}$	$\frac{3}{16}$	$\frac{1}{2}$	$\frac{11}{12}$	$\frac{2}{3}$	$\frac{7}{12}$
3.	$8\frac{3}{4}$	$6\frac{2}{3}$	$8\frac{1}{4}$	$7\frac{1}{2}$	$5\frac{4}{5}$	$4\frac{5}{8}$	$2\frac{4}{5}$
	$9\frac{2}{5}$	$8\frac{5}{9}$	$7\frac{3}{5}$	$6\frac{9}{16}$	$7\frac{7}{10}$	$5\frac{2}{3}$	$2\frac{1}{2}$
4.	$9\frac{2}{9}$	$4\frac{3}{4}$	$8\frac{3}{4}$	$7\frac{5}{12}$	$5\frac{7}{12}$	$7\frac{2}{3}$	$5\frac{1}{8}$
	$6\frac{5}{6}$	$1\frac{1}{6}$	$3\frac{5}{6}$	$9\frac{3}{4}$	$6\frac{5}{6}$	$4\frac{4}{5}$	$3\frac{1}{12}$

Problems

1. It is $\frac{3}{4}$ mi. to the store and $\frac{3}{8}$ mi. farther to school. How far is it to school?

2. Find the cost of $\frac{1}{2}$ lb. of pork at 42¢ a pound and $\frac{1}{2}$ lb. of steak at 48¢ a pound.

3. Lucy had $1\frac{3}{4}$ yd. of ribbon and used $\frac{5}{8}$ yd. How much did she have left?

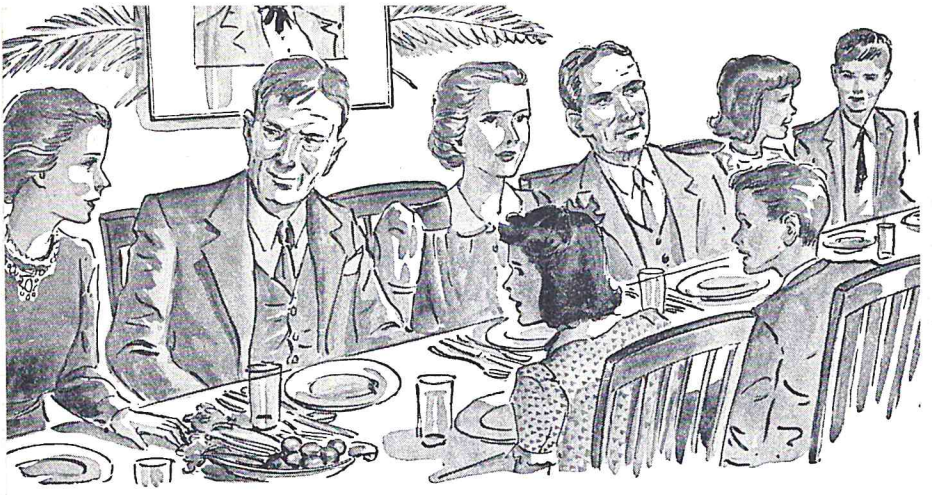
4. Two boys weigh $48\frac{3}{4}$ and $52\frac{1}{2}$ lb. What do both weigh?

5. An auto was driven $486\frac{7}{10}$ mi. on Monday and $347\frac{9}{10}$ mi. on Tuesday. How far was it driven in the two days?

6. Bob worked $2\frac{1}{2}$ hr. on Friday and $5\frac{1}{2}$ hr. on Saturday for 20¢ an hour. What did he earn in the two days?

7. What is the perimeter of a square table 2 ft. on each side? What is the area of the table?

8. A can filled with milk weighs $94\frac{3}{4}$ lb. The empty can weighs $15\frac{3}{8}$ lb. How much does the milk weigh?



The Lincoln School Banquet

The Lincoln School had a Lincoln's Birthday dinner.

1. Each of the four banquet tables was 24 ft. long. Places were set along the two long sides of the tables. Allowing 3 ft. for each person, how many persons could be served at each table? at the four tables?

2. Fifty-nine tickets were sold. At 45¢ a ticket, how much money was collected?

3. In ordering food, the banquet committee planned to serve 64 persons. They divided 1 quart of ice cream into 8 portions. How many quarts of ice cream were needed for 64 persons?

4. The committee allowed $1.35 for olives. At 27¢ a bottle, how many bottles of olives could they buy?

5. A glass of milk (1 cup) was provided for each of the 64 persons. How many quarts of milk were needed?

6. The hall in which the banquet was held is 32 ft. wide and 67 ft. long. What is the area of the hall?

7. The banquet began at 6 P.M. and ended at 9:30 P.M. How long did it last?

Subtraction of Fractions

1. One piece of cloth is $8\frac{3}{4}$ yd. long and another is $5\frac{1}{3}$ yd. Find the difference in length.

$$8\tfrac{3}{4} = 8\tfrac{9}{12}$$
$$5\tfrac{1}{3} = 5\tfrac{4}{12}$$
$$3\tfrac{5}{12}$$

Subtract $5\frac{1}{3}$ from $8\frac{3}{4}$.

Step 1. The l.c.d. is 12.

Step 2. Think $8\frac{3}{4} = 8\frac{9}{12}$ and $5\frac{1}{3} = 5\frac{4}{12}$.

Step 3. $\frac{9}{12} - \frac{4}{12} = \frac{5}{12}$. Write $\frac{5}{12}$. Subtract 5 from 8.

2. Subtract $19\frac{5}{6}$ from $34\frac{7}{8}$.

$$34\tfrac{7}{8} = 34\tfrac{21}{24}$$
$$19\tfrac{5}{6} = 19\tfrac{20}{24}$$
$$15\tfrac{1}{24}$$

Step 1. The l.c.d. is 24.

Step 2. Change $\frac{7}{8}$ and $\frac{5}{6}$ to 24ths.

Step 3. $\frac{21}{24} - \frac{20}{24} = \frac{1}{24}$. Write $\frac{1}{24}$ and subtract 19 from 34.

Subtract the following. Prove the remainders.

3.

$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{10}$
$\frac{2}{3}$	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{1}{16}$	$\frac{3}{5}$

4.

$3\frac{2}{3}$	$6\frac{5}{8}$	$9\frac{4}{9}$	$5\frac{7}{10}$	$7\frac{7}{8}$	$4\frac{1}{2}$	$5\frac{5}{6}$
$\frac{1}{2}$	$4\frac{1}{4}$	$2\frac{1}{3}$	$3\frac{1}{2}$	$5\frac{5}{6}$	$1\frac{3}{10}$	$4\frac{3}{5}$

5.

$11\frac{3}{4}$	$4\frac{1}{5}$	$5\frac{1}{4}$	$6\frac{9}{10}$	$5\frac{1}{3}$	$8\frac{5}{12}$	$7\frac{7}{8}$
$2\frac{1}{5}$	$2\frac{1}{10}$	$3\frac{1}{12}$	$\frac{4}{5}$	$2\frac{1}{12}$	$4\frac{1}{6}$	$5\frac{5}{12}$

6.

$6\frac{3}{4}$	$5\frac{8}{9}$	$7\frac{2}{3}$	$8\frac{1}{2}$	$9\frac{5}{8}$	$12\frac{7}{12}$	$16\frac{4}{5}$
$3\frac{5}{12}$	$\frac{2}{3}$	$3\frac{7}{12}$	$8\frac{2}{9}$	$4\frac{3}{16}$	$5\frac{1}{3}$	$7\frac{3}{10}$

Problems

1. Mr. Allen's yearly income is \$3200, and his expenses are \$2300. How much does he save?

2. Mr. Brown paid \$4800 for 80 acres of land. What was the price per acre?

1. Copy the bill on the right. Find the cost of each item and the total.

Number x price = cost

Telephone : Main 1326

J. B. KELLOGG

DRY GOODS

113 State Street
Franklin , Illinois

Sold to Mrs. J. C. Davis

Address 1032 Walton St.

8 yd.	ribbon @		09		
5 yd.	linen		26		
4 yd.	silk	1	79		
3 doz.	buttons		15		
6 yd.	braid		16		
6 yd.	lace		47		
3 pr.	stockings		89		

Find the total cost of the following:

2. 4 lb. butter @ 46¢. 2 doz. eggs @ 40¢. 3 lb. roast @ 37¢. 3 lb. coffee @ 29¢. 2 doz. oranges @ 43¢. 1 sack flour @ $1.29. 7 bars soap @ 6¢.

3. 4 chairs @ $7.45. 1 table @ $18.50. 7 pr. curtains @ $2.75. 3 lamps @ $8.75.

4. 3 woolen blankets @ $6.98. 9 towels @ 49¢. 8 sheets @ 98¢. 4 washcloths @ 15¢. 2 bedspreads @ $2.85. 8 pillow cases @ 29¢. 1 mat @ $2.65.

5. 8 yd. linen @ 65¢. 3 shirts @ $1.50. 5 pr. socks @ 35¢. 3 spools thread @ 7¢. 5 yd. woolen goods @ $1.69. 4 yd. cotton goods @ 26¢.

6. 6 baseballs @ 78¢. 2 bats @ $1.25. 3 gloves @ $1.39. 1 catcher's glove @ $2.45. 1 mask @ $2.15.

Find the numbers missing in the lines below:

Number	Price	Cost	Number	Price	Cost
7. 14 T.	$7.50	____	16 bu.	$1.20	____
8. __ lb.	$.30	$1.50	__ yd.	$2.00	$24.00
9. 20 gal.	____	$2.00	30 qt.	____	$3.60

Unit 22. Column Addition of Fractions

Adding Three Fractions

1. Add $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$.

$$\frac{2}{3}=\frac{8}{12}$$
$$\frac{3}{4}=\frac{9}{12}$$
$$\frac{5}{6}=\frac{10}{12}$$
$$\frac{27}{12}=2\frac{1}{4}$$

Step 1. To find the l.c.d., start with the largest denominator, 6. Think $2\times6=12$. 12 is the l.c.d. It can be divided exactly by 3, 4, and 6.

Step 2. Change $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$ to 12ths.

Step 3. Add $\frac{8}{12}$, $\frac{9}{12}$, and $\frac{10}{12}$. Think $\frac{27}{12}=2\frac{3}{12}=2\frac{1}{4}$.

2. Add $2\frac{2}{3}$, $4\frac{5}{6}$, and $3\frac{5}{8}$.

$$2\tfrac{2}{3}=2\tfrac{16}{24}$$
$$4\tfrac{5}{6}=4\tfrac{20}{24}$$
$$3\tfrac{5}{8}=3\tfrac{15}{24}$$
$$9\tfrac{51}{24}=11\tfrac{1}{8}$$

Step 1. To find the l.c.d., start with 8. Think $2\times8=16$. 16 cannot be divided exactly by 3 and 6. Think $3\times8=24$. 24 is the l.c.d.

Step 2. Change $\frac{2}{3}$, $\frac{5}{6}$, and $\frac{5}{8}$ to 24ths.

Step 3. Add the fractions $\frac{16}{24}$, $\frac{20}{24}$, and $\frac{15}{24}$; then add the whole numbers. Change the sum, $9\frac{51}{24}$, to its simplest form. Think $\frac{51}{24}=2\frac{3}{24}=2\frac{1}{8}$. Think $9+2\frac{1}{8}=11\frac{1}{8}$.

3.

$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{2}{3}$
$\frac{3}{4}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{2}{5}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{6}$
$\frac{5}{8}$	$\frac{1}{2}$	$\frac{5}{6}$	$\frac{1}{4}$	$\frac{3}{10}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{4}{9}$

4.

$\frac{1}{4}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{1}{8}$	$\frac{1}{3}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{5}$
$\frac{2}{5}$	$\frac{1}{6}$	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{9}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{3}$
$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{3}{10}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{7}{8}$	$\frac{1}{9}$	$\frac{4}{15}$

5.

$3\frac{3}{4}$	$4\frac{5}{6}$	$6\frac{5}{6}$	$8\frac{3}{4}$	$3\frac{3}{5}$	$1\frac{2}{3}$	$2\frac{1}{5}$
$5\frac{7}{8}$	$3\frac{1}{2}$	$2\frac{3}{4}$	$5\frac{1}{3}$	$2\frac{1}{2}$	$4\frac{1}{8}$	$3\frac{2}{3}$
$2\frac{1}{2}$	$6\frac{2}{3}$	$5\frac{1}{6}$	$\frac{3}{6}$	$5\frac{4}{5}$	$\frac{5}{6}$	$4\frac{3}{5}$

Practice in Addition of Fractions

1.

$\frac{2}{3}$	$\frac{1}{2}$	$\frac{7}{12}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{5}{12}$	$\frac{3}{8}$
$\frac{5}{12}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{2}{3}$
$\frac{3}{4}$	$\frac{1}{12}$	$\frac{1}{2}$	$\frac{3}{16}$	$\frac{7}{12}$	$\frac{1}{12}$	$\frac{2}{3}$	$\frac{7}{12}$

2.

$\frac{7}{8}$	$\frac{3}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{9}{10}$	$\frac{5}{6}$
$\frac{1}{2}$	$\frac{5}{12}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{3}{4}$	$\frac{7}{9}$	$\frac{1}{2}$	$\frac{2}{3}$
$\frac{3}{16}$	$\frac{5}{6}$	$\frac{1}{4}$	$\frac{11}{12}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{4}{9}$

3.

$6\frac{1}{2}$	$7\frac{2}{3}$	$\frac{7}{16}$	$5\frac{1}{2}$	$9\frac{2}{3}$	$6\frac{2}{5}$	$4\frac{5}{8}$
$\frac{3}{4}$	$8\frac{3}{4}$	$4\frac{7}{8}$	$7\frac{5}{6}$	$\frac{1}{2}$	$3\frac{3}{4}$	$\frac{5}{6}$
$8\frac{7}{16}$	$\frac{1}{12}$	$7\frac{9}{16}$	$\frac{7}{8}$	$\frac{5}{9}$	$8\frac{7}{10}$	$9\frac{5}{12}$

Problems

1. In three weeks Jim's baby brother gained $\frac{1}{2}$ lb., $\frac{3}{8}$ lb., and $\frac{5}{8}$ lb. How much did the baby gain in these weeks?

2. Find $\frac{1}{3}$ of a dozen, $\frac{1}{4}$ of a dozen, and $\frac{1}{6}$ of a dozen and add these numbers. Then add the fractions $\frac{1}{3}$, $\frac{1}{4}$, and $\frac{1}{6}$ to find what fraction of a dozen the sum is.

3. One-half lb., $\frac{1}{4}$ lb., and $\frac{1}{8}$ lb. are how many ounces? Add $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ to find what part of a pound this is.

4. Change these fractions to twelfths: $\frac{1}{2}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{2}{3}$.

5. Reduce to mixed numbers: $\frac{12}{8}$, $\frac{16}{12}$, $\frac{30}{24}$, $\frac{20}{16}$, $\frac{18}{10}$.

6. What is the l.c.d. for halves, thirds, and sixths?

7. Write 4 fractions, each of which is equal to 1.

8. Which fraction is greater, $\frac{2}{5}$ or $\frac{1}{5}$?

9. A package that weighs $\frac{3}{4}$ lb. is how many ounces heavier than a package that weighs $\frac{5}{8}$ lb.?

10. What is the cost of $2\frac{1}{4}$ tons of coal at $8 a ton?

Add, Subtract, Multiply, or Divide?

Always choose the operation to use before you try to solve a problem.

1. Walter's baby brother weighed $6\frac{3}{4}$ lb. at birth. After he gained $1\frac{1}{2}$ lb., how much did he weigh?

2. One book weighs $1\frac{1}{4}$ lb. and another weighs $1\frac{7}{8}$ lb. The one book weighs how much less than the other?

3. Alfred played outdoors $2\frac{1}{2}$ hours on Monday, $1\frac{1}{2}$ hours on Tuesday, and $\frac{1}{2}$ hour on Wednesday. How many hours did he play outdoors in the three days?

4. The three sides of a triangle measure $\frac{7}{8}$ in., $\frac{1}{2}$ in., and $\frac{3}{4}$ in. How many inches is it around the triangle?

5. One sheet of paper is $4\frac{3}{8}$ in. wide, another $6\frac{11}{16}$ in. wide. What is the difference in the widths?

6. If you cut a pie into 6 equal pieces, what is the fraction for 5 of the pieces?

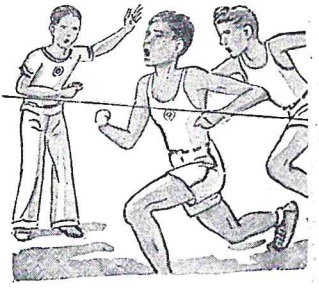
7. Martha bought $3\frac{1}{3}$ yards of cloth. Then she bought $1\frac{3}{4}$ yd. more. How many yards did she buy in all?

Practice for Accuracy

Give the answers. Watch the signs.

1.	$\frac{1}{8}+\frac{1}{8}$	$\frac{3}{4}-\frac{1}{2}$	$\frac{1}{8}+\frac{5}{16}$	$\frac{2}{3}-\frac{1}{6}$	$\frac{1}{4}+\frac{3}{4}$
2.	$\frac{1}{4}+\frac{3}{5}$	$\frac{7}{8}-\frac{1}{2}$	$\frac{1}{2}+\frac{2}{3}$	$\frac{4}{5}-\frac{1}{2}$	$\frac{1}{2}+\frac{1}{6}$
3.	$\frac{1}{2}+\frac{1}{10}$	$\frac{2}{3}-\frac{1}{2}$	$\frac{1}{2}+\frac{1}{12}$	$\frac{3}{8}-\frac{1}{3}$	$\frac{1}{2}+\frac{1}{5}$
4.	$\frac{3}{10}+\frac{1}{2}$	$\frac{7}{9}-\frac{1}{3}$	$\frac{2}{5}+\frac{1}{10}$	$\frac{5}{6}-\frac{1}{2}$	$\frac{1}{3}+\frac{1}{12}$
5.	$\frac{1}{3}+\frac{1}{4}$	$\frac{3}{10}-\frac{1}{5}$	$\frac{1}{4}+\frac{1}{5}$	$\frac{1}{2}-\frac{1}{5}$	$\frac{1}{4}+\frac{1}{6}$
6.	$\frac{1}{3}+\frac{1}{8}$	$\frac{3}{4}-\frac{1}{6}$	$\frac{1}{6}+\frac{1}{8}$	$\frac{5}{6}-\frac{3}{8}$	$\frac{1}{5}+\frac{1}{10}$
7.	$\frac{3}{5}-\frac{1}{4}$	$\frac{3}{8}+\frac{7}{16}$	$\frac{5}{6}-\frac{2}{3}$	$\frac{7}{8}+\frac{5}{16}$	$\frac{1}{2}-\frac{1}{3}$

Problem Practice



Write A, S, M, or D for each problem. Solve the problems.

1. Henry ran 100 yards in $12\frac{1}{5}$ seconds. Ed ran the same distance in $13\frac{4}{5}$ seconds. Find the difference in their time.

2. Mr. Lane owns two farms. One contains $76\frac{1}{8}$ acres, and the other $98\frac{3}{4}$ acres. How many acres does he own?

3. A farmer planted $10\frac{1}{2}$ acres of corn on Tuesday, $8\frac{3}{8}$ acres on Wednesday, and $12\frac{1}{4}$ acres on Thursday. How many acres of corn did he plant?

4. Joyce bought 3 remnants of ribbon. One measured $\frac{7}{8}$ yd., another $\frac{3}{4}$ yd., and the third $\frac{1}{2}$ yd. How many yards did she buy?

5. Harold caught 3 perch. One weighed $\frac{5}{8}$ lb., another weighed $1\frac{1}{2}$ lb., and the third weighed $\frac{3}{4}$ lb. How many pounds did they all weigh?

6. Howard walks $\frac{3}{4}$ mi. to school. His friend walks $\frac{1}{8}$ mi. farther. How far does his friend walk?

7. From a bolt of cloth containing $48\frac{1}{2}$ yards, $8\frac{3}{4}$ yards were sold to one customer and $6\frac{1}{2}$ yards to another. How many yards were left in the bolt?

8. While spending 3 weeks in the hospital, Louis gained in weight the following amounts: $\frac{1}{2}$ lb., $\frac{1}{4}$ lb., and $\frac{3}{4}$ lb. How much did he gain in all?

9. During 3 weeks of cold weather we used the following amounts of coal: $\frac{3}{8}$ ton, $\frac{1}{2}$ ton, and $\frac{1}{4}$ ton. How much coal did we use in the 3 weeks?

10. Virginia is $53\frac{1}{2}$ in. tall, and Martha is $49\frac{1}{4}$ in. tall. Find the difference in their heights.

Addition and Subtraction of Fractions

Add the fractions below:

1.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{5}$	$\frac{1}{4}$
$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{5}{6}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{4}{5}$
$\frac{1}{4}$	$\frac{7}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{5}{6}$	$\frac{7}{10}$	$\frac{9}{10}$

2.

$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{5}{6}$
$\frac{1}{3}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{1}{4}$
$\frac{3}{4}$	$\frac{7}{8}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{8}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{7}{8}$

Subtract the numbers below:

3.

$7\frac{7}{8}$	$9\frac{7}{12}$	$8\frac{5}{6}$	$4\frac{5}{9}$	$6\frac{3}{4}$	$5\frac{5}{8}$	$2\frac{2}{3}$
$2\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{1}{3}$	$1\frac{1}{2}$	$3\frac{2}{3}$	$4\frac{1}{16}$	$1\frac{2}{9}$

4.

$6\frac{9}{16}$	$4\frac{7}{8}$	$6\frac{9}{10}$	$10\frac{4}{5}$	$8\frac{7}{8}$	$5\frac{4}{5}$	$6\frac{11}{12}$
$6\frac{3}{8}$	$2\frac{2}{3}$	$\frac{1}{2}$	$2\frac{1}{4}$	$\frac{5}{6}$	$5\frac{2}{3}$	$4\frac{5}{6}$

Problems

1. Three boards are $4\frac{1}{3}$ ft., $2\frac{1}{2}$ ft., and $5\frac{3}{4}$ ft. in length. What is the total length of the boards? Is there a way to solve this problem other than by adding $\frac{1}{3}$, $\frac{1}{2}$, and $\frac{3}{4}$ ft.? Explain.

2. Jerry weighs $68\frac{1}{2}$ lb., and Ed weighs $74\frac{3}{4}$ lb. What is the difference in their weights?

3. Find the number of inches in $\frac{1}{2}$ yd., $\frac{1}{3}$ yd., and $\frac{1}{6}$ yd. and add these. Then add $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{6}$. The sum of these fractions is what part of a yard?

4. Howard weighs $67\frac{1}{2}$ lb., Henry $71\frac{3}{4}$ lb., and Louis 70 lb. What is the total weight of these boys?

5. Bob's father had 12 gallons of honey and sold it at 60¢ a quart. How much did he get for this honey?

Practice in Subtraction of Fractions

1.	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{5}{6}$	$\frac{7}{8}$
	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{4}$	$\frac{1}{9}$	$\frac{1}{3}$	$\frac{3}{4}$
2.	$\frac{7}{8}$	$\frac{5}{12}$	$\frac{3}{4}$	$\frac{3}{5}$	$\frac{5}{6}$	$\frac{1}{4}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{3}{4}$
	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{3}{5}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{10}$	$\frac{5}{6}$	$\frac{2}{5}$	$\frac{3}{10}$

3.	$9\frac{7}{12}$	$6\frac{5}{8}$	$7\frac{2}{3}$	$8\frac{5}{12}$	$4\frac{7}{16}$	$3\frac{5}{8}$	$6\frac{7}{8}$
	$8\frac{1}{4}$	$3\frac{3}{16}$	$4\frac{4}{9}$	$6\frac{1}{3}$	$3\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{2}{3}$
4.	$4\frac{9}{10}$	$8\frac{5}{6}$	$7\frac{9}{10}$	$9\frac{5}{6}$	$2\frac{1}{2}$	$5\frac{11}{12}$	$8\frac{3}{4}$
	$2\frac{1}{2}$	$3\frac{3}{4}$	$4\frac{3}{5}$	$7\frac{5}{8}$	$\frac{3}{16}$	$5\frac{5}{6}$	$4\frac{11}{16}$
5.	$7\frac{7}{12}$	$4\frac{3}{10}$	$6\frac{1}{2}$	$9\frac{3}{4}$	$6\frac{2}{3}$	$8\frac{7}{12}$	$7\frac{1}{4}$
	$3\frac{1}{4}$	$2\frac{1}{5}$	$1\frac{1}{10}$	$4\frac{2}{3}$	$6\frac{2}{9}$	$5\frac{3}{8}$	$3\frac{3}{16}$

Sight Problems

1. At 2 for 5¢, how many oranges can be bought for 25¢?

2. At 25¢ a dozen, what will 5 dozen apples cost?

3. At $8.50 a ton, what will 5 tons of hay cost?

4. At $7 a ton, what is the cost of 3 tons of coal?

5. If I buy 6 yd. of dress goods at 70¢ a yard, what change should I get from $5?

6. Walter bought $\frac{3}{4}$ lb. of candy. He divided $\frac{1}{2}$ lb. with his friends. How much did he have left?

7. When cabbage sells at 4 lb. for 10¢, what is the price per pound?

8. What is the total weight of three parcel-post packages weighing $\frac{1}{8}$, $\frac{1}{4}$, and $\frac{1}{2}$ lb.?

Unit 23. Subtraction of Fractions

Subtracting Fractions from Whole Numbers

1. Virginia has \$1. If she spends $\frac{1}{4}$ of her dollar, what part of a dollar will she have left?

$$\begin{array}{r} 1 \\ \frac{1}{4} \\ \hline \frac{3}{4} \end{array}$$

Think $1-\frac{1}{4}=\frac{4}{4}-\frac{1}{4}=\frac{3}{4}$. Write $\frac{3}{4}$.

2. Joyce cut an apple into 4 equal pieces. She gave away $\frac{3}{4}$ of the apple. How much was left?

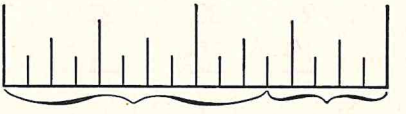
Think $1-\frac{3}{4}=\frac{4}{4}-\frac{3}{4}=\frac{1}{4}$. Write $\frac{1}{4}$.

3. Mildred cut each of 3 pies into 6 equal pieces. After serving $\frac{5}{6}$ of a pie, how much pie did she have remaining?

$$\begin{array}{rl} 3 & =2\frac{6}{6} \\ \frac{5}{6} & =\frac{5}{6} \\ \hline & 2\frac{1}{6} \end{array}$$

You cannot subtract $\frac{5}{6}$ from $\frac{0}{6}$. Think $3=2\frac{6}{6}$. Write $2\frac{6}{6}$ and $\frac{5}{6}$ as shown. Think $2\frac{6}{6}-\frac{5}{6}=2\frac{1}{6}$. The remainder is $2\frac{1}{6}$. Proof: $2\frac{1}{6}+\frac{5}{6}=3$.

4. Draw a line 2 inches long. Measure off $\frac{5}{8}$ in. from one end; then measure the rest of the line.



$1\frac{3}{8}$ in. $\frac{5}{8}$ in.

To prove your measurements are right, subtract $\frac{5}{8}$ from 2. You cannot subtract $\frac{5}{8}$ from $\frac{0}{8}$. Change 2 to $1\frac{8}{8}$. Think $1\frac{8}{8}-\frac{5}{8}=1\frac{3}{8}$. The remainder is $1\frac{3}{8}$. Proof: $1\frac{3}{8}+\frac{5}{8}=2$.

$$\begin{array}{rl} 2 & =1\frac{8}{8} \\ \frac{5}{8} & =\frac{5}{8} \\ \hline & 1\frac{3}{8} \end{array}$$

5. If you measure $2\frac{3}{4}$ in. from one end of a line 5 in. long, how much is left?

You cannot subtract $\frac{3}{4}$ from $\frac{0}{4}$. Think $5=4\frac{4}{4}$. Write $4\frac{4}{4}$ and $2\frac{3}{4}$ as shown. Think $4\frac{4}{4}-2\frac{3}{4}=2\frac{1}{4}$. Write $2\frac{1}{4}$. The remainder is $2\frac{1}{4}$. Proof: $2\frac{1}{4}+2\frac{3}{4}=5$.

$$\begin{array}{rl} 5 & =4\frac{4}{4} \\ 2\frac{3}{4} & =2\frac{3}{4} \\ \hline & 2\frac{1}{4} \end{array}$$

Subtraction of Mixed Numbers

1. Study the subtraction in each example:

10	19	36	84	90
$4\frac{2}{3}$	$5\frac{3}{10}$	$10\frac{3}{5}$	$27\frac{5}{12}$	$24\frac{7}{16}$
$5\frac{1}{3}$	$13\frac{7}{10}$	$25\frac{2}{5}$	$56\frac{7}{12}$	$65\frac{9}{16}$

Subtract the following:

2.	$1-\frac{3}{8}$	$1-\frac{2}{3}$	$1-\frac{4}{5}$	$1-\frac{5}{8}$	$1-\frac{2}{5}$
3.	$3-\frac{1}{8}$	$2-\frac{7}{8}$	$3-\frac{3}{4}$	$5-\frac{1}{6}$	$3-\frac{3}{5}$
4.	$1-\frac{2}{9}$	$2-\frac{5}{6}$	$1-\frac{5}{12}$	$1-\frac{1}{16}$	$2-\frac{9}{16}$
5.	$2-\frac{2}{3}$	$3-\frac{1}{5}$	$2-\frac{3}{8}$	$4-\frac{1}{2}$	$3-\frac{5}{12}$
6.	$1-\frac{1}{10}$	$2-\frac{3}{10}$	$3-\frac{7}{10}$	$2-\frac{9}{10}$	$1-\frac{3}{7}$

7.	9	8	7	9	5	18	8
	$2\frac{1}{2}$	$2\frac{3}{4}$	$5\frac{2}{3}$	$8\frac{4}{5}$	$2\frac{5}{6}$	$3\frac{7}{8}$	$4\frac{2}{5}$
8.	24	30	27	13	25	85	62
	$19\frac{1}{3}$	$15\frac{1}{4}$	$6\frac{5}{12}$	$7\frac{9}{10}$	$24\frac{2}{5}$	$74\frac{5}{16}$	$23\frac{3}{7}$
9.	$4\frac{2}{3}$	$3\frac{1}{2}$	$5\frac{2}{3}$	$6\frac{1}{4}$	$6\frac{5}{6}$	$12\frac{1}{2}$	$16\frac{3}{4}$
	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{3}{4}$	$\frac{3}{16}$	$\frac{5}{8}$
10.	$15\frac{8}{9}$	$10\frac{7}{12}$	$14\frac{5}{6}$	$20\frac{5}{8}$	$17\frac{3}{4}$	$32\frac{9}{10}$	$40\frac{7}{8}$
	$3\frac{2}{9}$	$9\frac{1}{12}$	$8\frac{1}{6}$	$5\frac{1}{8}$	$9\frac{1}{4}$	$19\frac{3}{10}$	17
11.	$17\frac{5}{8}$	$16\frac{1}{2}$	$26\frac{2}{3}$	$15\frac{3}{4}$	$31\frac{9}{10}$	$16\frac{3}{4}$	$21\frac{7}{9}$
	$4\frac{5}{8}$	$5\frac{1}{4}$	$14\frac{1}{6}$	$4\frac{3}{8}$	$17\frac{2}{5}$	$11\frac{1}{3}$	$17\frac{2}{3}$
12.	$49\frac{1}{2}$	$38\frac{3}{4}$	$65\frac{5}{8}$	$27\frac{1}{3}$	$13\frac{5}{6}$	30	$32\frac{9}{10}$
	$29\frac{1}{6}$	$17\frac{1}{6}$	$45\frac{1}{3}$	$7\frac{1}{9}$	$8\frac{5}{12}$	$9\frac{11}{12}$	$18\frac{4}{5}$

Sight Problems

1. Violet used $1\frac{3}{4}$ cups of flour for a cake and $5\frac{1}{2}$ cups of flour for cookies. How many cups of flour did she use for both?

2. At 12 cans for 60¢, what does one can of soup cost?

3. Ed's father worked 5 days last week and $3\frac{1}{4}$ days this week. How much less time did he work this week?

4. One board is 6 inches wide and another is $3\frac{1}{4}$ inches wide. How much wider is the 6-inch board?

5. Howard is 54 inches tall, and his father is $69\frac{3}{4}$ inches tall. How much taller is his father?

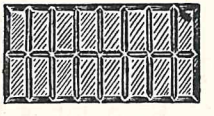
6. Jim worked $1\frac{1}{2}$ hours one Saturday and $2\frac{1}{4}$ hours on another Saturday. How many hours did he work on both Saturdays?

7. At 60¢ an hour, how much will a workman earn in 5 days of 8 hours each?

8. At 3 bars for 25¢, what do $\frac{1}{2}$ dozen bars of soap cost?

9. At 2 cans for 23¢, what will 12 cans of beans cost?

10. Mrs. Harrison had $\frac{7}{8}$ of a bar of chocolate. After using $\frac{3}{8}$ of a bar in making candy, how much did she have left?



11. At $1.50 a pair, how much money is needed to buy 4 pairs of curtains?

12. At 3 for 10¢, what is the cost of 9 pencils?

13. After buying 2 cans of peaches at 15¢ a can, what is my change from $1?

14. Alfred's mother bought a piece of cloth 9 yards long. After using some for a dress, she had $4\frac{2}{3}$ yards left. How many yards did she use for the dress?

Areas and Perimeters

Write A, S, M, or D for each step. Solve the problems.

1. How many acres are there in a field 140 rods long and 75 rods wide?

Step 1. $75 \times 140 = 10{,}500$ sq. rd.

Step 2. $10{,}500 \div 160 = 65\frac{10}{16}$ acres. To reduce $\frac{10}{16}$ to its lowest terms, divide both terms by 2.

$$160\overline{)10500}\quad 65\tfrac{5}{8}$$
$$96$$
$$90$$
$$80$$
$$10$$
$$\tfrac{10}{16} = \tfrac{5}{8}$$

2. How many acres are there in a farm that is 142 rods by 310 rods?

3. How many square yards are there in a walk that is 6 feet wide and 120 feet long?

4. What is the perimeter of a room that is 4 yards wide and 6 yards long? (Draw a rectangle to show that $2 \times (\text{length} + \text{width}) = \text{perimeter}$.)

5. How many square yards are there in the area of a floor 21 feet long and 17 feet wide?

6. A field is 48 rods wide and 96 rods long. How many rods of fencing are needed to go around the field?

7. A room is 16 feet wide and $24\frac{1}{4}$ feet long. How many feet of molding are needed to go around it?

8. A lot is 135 feet long and 60 feet wide. Find its perimeter in yards and its area in square yards. (Draw a rectangle to show the dimensions of the lot.)

9. Find the area and the perimeter of a room 12 ft. wide and 18 ft. long.

10. How many square yards are there in a floor that is 15 feet wide and 24 feet long?

11. At \$4.36 a square yard, what is the cost of a rug that is 9 ft. wide and 12 ft. long?

Areas and Perimeters

For each step write A, S, M, or D. Solve the problems.

1. Which is larger, a sheet of paper 7 in. by 12 in. or a sheet 8 in. by 11 in.?

2. Harold has a garden plot 5 yd. wide and 8 yd. long. Bob's garden plot is 6 yd. wide and 7 yd. long. Which of the two gardens is larger? Which garden has the greater perimeter?

3. One storeroom measures 24 ft. by 56 ft., and another storeroom measures 28 ft. by 49 ft. Which room has the larger floor space? how much larger?

4. A baseball diamond is a square with each side 90 et long. Find the area in square yards and the perimter in yards. (Draw a diagram of a baseball diamond and show the dimensions.)

5. If a square city block is 440 feet long on each side, what is the perimeter of the block?

6. A playground is 32 rods wide and 76 rods long. How many rods of fencing would be needed to go around the playground?

7. How many acres are there in a pasture 65 rods long and 42 rods wide?

8. Which has more area, a lot 50 ft. by 120 ft. or one 60 ft. by 100 ft.? Which has the greater perimeter?

9. A lot is 40 ft. wide and 135 ft. long. How many feet of fencing will it take to fence one end and two sides of the lot? (Draw a diagram of the lot.)

10. Alfred has a garden 16 ft. wide and 30 ft. long. At 24¢ a foot, what will it cost to buy wire fencing for his garden?

Addition and Subtraction of Fractions

Subtract the following:

1.

$\frac{7}{8}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{4}{5}$	$\frac{2}{3}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{5}{6}$
$\frac{3}{4}$	$\frac{3}{10}$	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{4}{9}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{3}{4}$

2.

$\frac{7}{8}$	$\frac{3}{4}$	$\frac{9}{10}$	$\frac{7}{8}$	$\frac{2}{3}$	$\frac{9}{10}$	$\frac{7}{12}$	$\frac{5}{7}$
$\frac{5}{6}$	$\frac{1}{5}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{9}$	$\frac{3}{5}$	$\frac{1}{6}$	$\frac{1}{2}$

3.

$\frac{5}{6}$	$\frac{7}{12}$	$\frac{5}{8}$	$\frac{3}{5}$	$\frac{5}{6}$	$\frac{5}{6}$	$\frac{3}{4}$	$\frac{5}{9}$
$\frac{2}{9}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{3}{8}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{6}$

Add the following:

4. $\frac{1}{2}+\frac{1}{4}$ $\quad\frac{2}{3}+\frac{1}{2}$ $\quad\frac{3}{8}+\frac{1}{2}$ $\quad\frac{1}{4}+\frac{3}{8}$ $\quad\frac{1}{6}+\frac{1}{8}$

5. $\frac{1}{2}+\frac{1}{5}$ $\quad\frac{1}{4}+\frac{1}{5}$ $\quad\frac{1}{4}+\frac{9}{10}$ $\quad\frac{1}{8}+\frac{5}{12}$ $\quad\frac{1}{8}+\frac{5}{6}$

Mixed Practice

1.

8	9	5	6	8	7	5	8	9
5	3	5	4	7	9	6	6	6
7	8	9	9	8	7	7	9	9

2.

$23.87	$24.35	$114.36	$96.54	347
5.92	18.87	23.47	7.97	895
96.08	81.23	546.90	.75	84
28.91	7.36	9.73	29.46	563
4.36	65.85	78.15	74.83	754
57.13	93.44	34.20	8.69	638

3. $607.83 × 68 $\quad$ $945.28 × 179 $\quad$ $78\overline{)5004}$ $\quad$ $74\overline{)42968}$

4.

675	489	679	$1240.70	948592
×789	×607	×760	−674.88	−654699

Unit 24. Subtraction of Fractions

Subtracting Fractions and Mixed Numbers

1. Mrs. Brown cut $\frac{2}{3}$ of a yard from a piece of cloth $2\frac{1}{3}$ yd. long. How many yards of cloth were left?

Subtract $\frac{2}{3}$ from $2\frac{1}{3}$. You cannot subtract $\frac{2}{3}$ from $\frac{1}{3}$. Take 1 from 2 and add 1, or $\frac{3}{3}$, to $\frac{1}{3}$. Write $1\frac{4}{3}$ and $\frac{2}{3}$ as shown at the right. Think $1\frac{4}{3}-\frac{2}{3}=1\frac{2}{3}$. $1\frac{2}{3}$ yards were left. Proof: $1\frac{2}{3}+\frac{2}{3}=2\frac{1}{3}$.

$$2\tfrac{1}{3}=1\tfrac{4}{3}$$
$$\tfrac{2}{3}=\underline{\tfrac{2}{3}}$$
$$1\tfrac{2}{3}$$

2. Subtract $2\frac{7}{8}$ from $6\frac{3}{8}$.

You cannot subtract $\frac{7}{8}$ from $\frac{3}{8}$. Therefore, change $6\frac{3}{8}$ to $5\frac{11}{8}$. Think $5\frac{11}{8}-2\frac{7}{8}=3\frac{4}{8}=3\frac{1}{2}$. Write $3\frac{4}{8}=3\frac{1}{2}$. The remainder is $3\frac{1}{2}$.

$$6\tfrac{3}{8}=5\tfrac{11}{8}$$
$$2\tfrac{7}{8}=\underline{2\ \tfrac{7}{8}}$$
$$3\ \tfrac{4}{8}=3\tfrac{1}{2}$$

Proof: $3\frac{1}{2}+2\frac{7}{8}=6\frac{3}{8}$. With your ruler you can show that $6\frac{3}{8}$ in. $-2\frac{7}{8}$ in. $=3\frac{1}{2}$ in.

To subtract mixed numbers when the upper fraction is less than the lower fraction, add 1 to the upper. Subtract 1 from ones' place in the minuend.

Practice with the examples below until you can add 1 to each fraction quickly. Ex.: $1+\frac{1}{4}=\frac{4}{4}+\frac{1}{4}=\frac{5}{4}$.

3. $1+\frac{1}{4}$ $\quad 1+\frac{1}{8}$ $\quad 1+\frac{1}{6}$ $\quad 1+\frac{3}{4}$ $\quad 1+\frac{5}{8}$

4. $1+\frac{1}{5}$ $\quad 1+\frac{1}{10}$ $\quad 1+\frac{3}{10}$ $\quad 1+\frac{2}{5}$ $\quad 1+\frac{7}{10}$

5. $1+\frac{5}{12}$ $\quad 1+\frac{3}{16}$ $\quad 1+\frac{1}{9}$ $\quad 1+\frac{1}{3}$ $\quad 1+\frac{3}{5}$

6. Explain the steps in each subtraction below. Then copy the examples and subtract.

$$7\tfrac{1}{4}=6\tfrac{5}{4} \qquad 5\tfrac{1}{5}=4\tfrac{6}{5} \qquad 7\tfrac{5}{12}=6\tfrac{17}{12} \qquad 8\tfrac{1}{6}=7\tfrac{7}{6}$$
$$2\tfrac{3}{4}=\underline{2\tfrac{3}{4}} \qquad 2\tfrac{4}{5}=\underline{2\tfrac{4}{5}} \qquad 2\tfrac{7}{12}=\underline{2\tfrac{7}{12}} \qquad 3\tfrac{5}{6}=\underline{3\tfrac{5}{6}}$$
$$4\tfrac{2}{4}=4\tfrac{1}{2} \qquad 2\tfrac{2}{5} \qquad 4\tfrac{10}{12}=4\tfrac{5}{6} \qquad 4\tfrac{2}{6}=4\tfrac{1}{3}$$

Subtraction of Fractions

1. Be sure that you understand the steps in the subtraction below.

Can you subtract $\frac{7}{16}$ from $\frac{3}{16}$?

Explain how $10\frac{3}{16} = 9\frac{3}{16} + \frac{16}{16} = 9\frac{19}{16}$.

How do you prove that $6\frac{3}{4} + 3\frac{7}{16} = 10\frac{3}{16}$?

$$10\tfrac{3}{16} = 9\tfrac{19}{16}$$
$$3\tfrac{7}{16} = 3\tfrac{7}{16}$$
$$6\tfrac{12}{16} = 6\tfrac{3}{4}$$

Find the remainders in the examples below:

2. $4\frac{3}{4} - 2\frac{1}{4}$ $\quad 6\frac{1}{4} - 2\frac{3}{4}$ $\quad 5 - 2\frac{1}{2}$ $\quad 2\frac{1}{3} - \frac{2}{3}$

3. $6\frac{8}{9} - 2\frac{5}{9}$ $\quad 2\frac{7}{8} - 2\frac{1}{8}$ $\quad 4\frac{5}{6} - 2\frac{1}{6}$ $\quad 3\frac{1}{6} - 1\frac{5}{6}$

4. $1\frac{7}{8} - \frac{3}{8}$ $\quad 1\frac{3}{8} - \frac{7}{8}$ $\quad 2\frac{3}{10} - \frac{7}{10}$ $\quad 4\frac{9}{10} - 2\frac{1}{10}$

5. $2\frac{11}{12} - 1\frac{5}{12}$ $\quad 4\frac{1}{5} - 2\frac{4}{5}$ $\quad 3\frac{2}{3} - 1\frac{1}{3}$ $\quad 10 - 6\frac{7}{8}$

Find the remainders in the examples below:

6.

$4\frac{1}{4}$	$14\frac{1}{8}$	$9\frac{1}{6}$	$13\frac{2}{5}$	$10\frac{1}{3}$	$6\frac{1}{12}$	$7\frac{3}{8}$
$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{6}$	$\frac{3}{5}$	$3\frac{2}{3}$	$4\frac{5}{12}$	$2\frac{5}{8}$

7.

$7\frac{1}{10}$	$9\frac{5}{8}$	$12\frac{1}{5}$	$8\frac{1}{9}$	$15\frac{3}{10}$	$26\frac{3}{8}$	$17\frac{5}{12}$
$4\frac{3}{10}$	$6\frac{7}{8}$	$9\frac{4}{5}$	$\frac{2}{9}$	$10\frac{7}{10}$	$19\frac{7}{8}$	$9\frac{11}{12}$

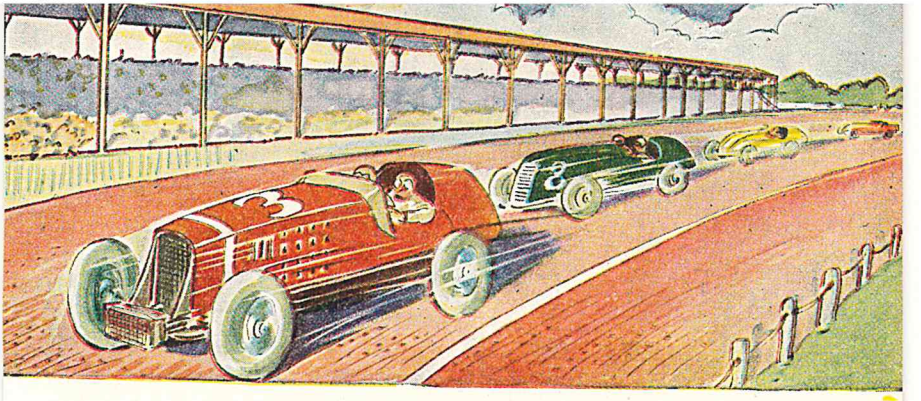
8.

$2\frac{3}{5}$	$7\frac{2}{9}$	$9\frac{1}{10}$	$5\frac{5}{12}$	$18\frac{2}{5}$	$50\frac{2}{9}$	$42\frac{3}{10}$
$1\frac{4}{5}$	$6\frac{4}{9}$	$8\frac{9}{10}$	$2\frac{7}{12}$	$11\frac{4}{5}$	$14\frac{8}{9}$	$29\frac{9}{10}$

Problems

1. A clerk had $21\frac{3}{4}$ yd. of cloth in one piece. He sold $6\frac{1}{4}$ yd. to one woman and 9 yd. to another. How many yards should he have left in the piece?

2. Mildred practiced $1\frac{1}{4}$ hr. on Monday, $1\frac{1}{2}$ hr. on Tuesday, and $1\frac{1}{3}$ hr. on Wednesday. How many hours did she practice in the three days?



Automobile Speeds

1. The first automobile race occurred in 1895. The distance, 70 miles, was covered in about 7 hours. What was the speed per hour?

2. In 1938 Floyd Roberts drove the 500 miles at Indianapolis Speedway at an average speed of $117\frac{2}{10}$ mi. per hour. The year before, Wilbur Shaw averaged $113\frac{6}{10}$ mi. per hour. How much greater was Roberts' speed?

3. It is $2\frac{1}{2}$ miles around the Indianapolis track. How many feet is this? how many rods?

4. In 1939 John R. Cobb drove a car at a speed of nearly 370 mi. per hour. How fast was he traveling per minute?

5. At 60 miles an hour, how long will it take a car to go $\frac{1}{2}$ mile?

6. How many feet does a car going 60 miles an hour move in 1 second?

7. At an average speed of 33 miles per hour, how many hours of driving time would be needed to drive 3173 miles from New York to San Francisco?

8. It is about 1600 miles from Chicago to Helena, Montana. What speed must a car average to make the trip in 50 hours?

Sight Work

Add the following:

1.	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$
	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{1}{3}$
2.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{3}$
	$\frac{5}{6}$	$\frac{1}{12}$	$\frac{5}{12}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{2}{3}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{3}{4}$
3.	$\frac{1}{3}$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{4}{5}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{8}$
	$\frac{1}{8}$	$\frac{1}{5}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{6}$
4.	$\frac{5}{8}$	$\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{12}$	$\frac{7}{10}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{5}{12}$
	$\frac{5}{12}$	$\frac{1}{16}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{4}{9}$	$\frac{5}{12}$	$\frac{1}{10}$	$\frac{1}{3}$

Subtract the fractions below:

5.	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{7}{8}$
	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{9}{16}$
6.	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{2}{3}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{4}{5}$
	$\frac{1}{2}$	$\frac{1}{12}$	$\frac{5}{12}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{4}$
7.	$\frac{3}{4}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$
	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{2}{9}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{1}{10}$

Finding Out What You Have Learned

Read and give the missing words or numbers.

1. In the fraction $\frac{3}{4}$, 3 is called the __, and 4 the __. The numbers 3 and 4 are the __ of the fraction.

2. In a proper fraction the __ is less than the __.

3. Two examples of improper fractions are __ and __.

Subtraction of Fractions

1. Ed has 2 melons; one weighs $3\frac{1}{4}$ lb., the other $2\frac{1}{2}$ lb. Find the difference in their weights.

Subtract $2\frac{1}{2}$ from $3\frac{1}{4}$.

$$3\tfrac{1}{4} = 2\tfrac{5}{4}$$
$$2\tfrac{1}{2} = 2\tfrac{2}{4}$$
$$\tfrac{3}{4}$$

Step 1. The l.c.d. of $\frac{1}{4}$ and $\frac{1}{2}$ is 4.

Step 2. You cannot subtract $\frac{1}{2}$ from $\frac{1}{4}$. Therefore, change $3\frac{1}{4}$ to $2\frac{5}{4}$, and $\frac{1}{2}$ to $\frac{2}{4}$. Write $2\frac{5}{4}$ and $2\frac{2}{4}$ as shown in the box.

Step 3. Subtract $2\frac{2}{4}$ from $2\frac{5}{4}$. Write $\frac{3}{4}$. The remainder is $\frac{3}{4}$. Proof: $\frac{3}{4} + 2\frac{1}{2} = 3\frac{1}{4}$.

Subtract the following and prove the remainders.

2.

$9\frac{1}{2} = 8\frac{6}{4}$	$6\frac{1}{6} = 5\frac{7}{6}$	$8\frac{1}{2} = 7\frac{9}{6}$	$7\frac{1}{12} = 6\frac{13}{12}$
$4\frac{3}{4} = 4\frac{3}{4}$	$3\frac{1}{2} = 3\frac{3}{6}$	$4\frac{5}{6} = 4\frac{5}{6}$	$2\frac{1}{3} = 2\frac{4}{12}$
$\frac{3}{4}$	$2\frac{4}{6} = 2\frac{2}{3}$	$3\frac{4}{6} = 3\frac{2}{3}$	$4\frac{9}{12} = 4\frac{3}{4}$

3.

$3\frac{1}{4}$	$4\frac{1}{6}$	$6\frac{1}{8}$	$8\frac{1}{6}$	$7\frac{1}{8}$	$9\frac{1}{2}$	$5\frac{1}{8}$
$2\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{4}$	$4\frac{1}{3}$	$3\frac{1}{2}$	$6\frac{3}{4}$	$1\frac{3}{4}$

4.

$5\frac{1}{6}$	$9\frac{3}{8}$	$3\frac{1}{4}$	$4\frac{1}{2}$	$8\frac{1}{3}$	$9\frac{1}{2}$	$6\frac{1}{4}$
$2\frac{2}{3}$	$5\frac{1}{2}$	$1\frac{3}{8}$	$3\frac{5}{8}$	$3\frac{5}{6}$	$7\frac{5}{6}$	$5\frac{7}{8}$

5.

$3\frac{1}{8}$	$4\frac{1}{4}$	$6\frac{1}{6}$	$9\frac{1}{4}$	$7\frac{2}{3}$	$4\frac{3}{4}$	$10\frac{1}{5}$
$2\frac{3}{4}$	$2\frac{1}{3}$	$4\frac{1}{4}$	$6\frac{5}{6}$	$1\frac{3}{4}$	$3\frac{5}{6}$	$9\frac{1}{2}$

6.

$19\frac{1}{10}$	$36\frac{2}{3}$	$42\frac{1}{9}$	$60\frac{3}{8}$	$21\frac{1}{8}$	$59\frac{1}{2}$	$75\frac{1}{5}$
$9\frac{1}{2}$	$17\frac{5}{6}$	$28\frac{2}{3}$	$37\frac{3}{4}$	$9\frac{1}{3}$	$38\frac{3}{5}$	$24\frac{1}{4}$

Use your foot ruler to find the remainders below:

7. $2\frac{1}{4}$ in. $- 1\frac{1}{2}$ in. $= \frac{3}{4}$ in. $\quad 2\frac{1}{2}$ in. $- 1\frac{3}{8}$ in. $= 1\frac{1}{8}$ in.

8. $3\frac{1}{2}$ in. $- 1\frac{3}{4}$ in. $= 1\frac{3}{4}$ in. $\quad 3\frac{1}{4}$ in. $- 1\frac{5}{8}$ in. $= 1\frac{5}{8}$ in.

9. $3\frac{1}{2}$ in. $- 1\frac{7}{8}$ in. $= 1\frac{5}{8}$ in. $\quad 2\frac{1}{8}$ in. $- 1\frac{1}{4}$ in. $= \frac{7}{8}$ in.

Practice in Fractions

In each pair of fractions, tell which is the larger, and subtract:

1.	$\frac{1}{2}$ $\frac{1}{3}$	$\frac{1}{3}$ $\frac{1}{4}$	$\frac{1}{6}$ $\frac{1}{3}$	$\frac{1}{3}$ $\frac{1}{2}$	$\frac{1}{8}$ $\frac{1}{6}$
2.	$\frac{2}{3}$ $\frac{3}{4}$	$\frac{4}{9}$ $\frac{1}{2}$	$\frac{1}{4}$ $\frac{3}{8}$	$\frac{5}{6}$ $\frac{3}{4}$	$\frac{3}{4}$ $\frac{7}{8}$

Add the following without using pencil and paper:

3.	$\frac{3}{4}+\frac{1}{2}$	$\frac{1}{2}+\frac{1}{3}$	$\frac{1}{4}+\frac{1}{8}$	$\frac{1}{5}+\frac{1}{10}$	$\frac{7}{10}+\frac{1}{5}$
4.	$\frac{1}{3}+\frac{1}{4}$	$\frac{2}{5}+\frac{1}{2}$	$\frac{1}{2}+\frac{1}{8}$	$\frac{3}{8}+\frac{1}{4}$	$\frac{1}{5}+\frac{1}{4}$
5.	$\frac{1}{2}+\frac{3}{8}$	$\frac{1}{3}+\frac{1}{5}$	$\frac{1}{5}+\frac{3}{10}$	$\frac{1}{2}+\frac{3}{16}$	$\frac{3}{4}+\frac{5}{16}$

Problem Practice

Write A, S, M, or D for each step. Solve the problems.

1. Last year Harold weighed $69\frac{3}{4}$ lb., and this year he weighs 80 lb. How much has he gained?

2. Mildred weighs $67\frac{1}{2}$ lb., and Violet weighs $69\frac{3}{4}$ lb. What is the difference in their weights?

3. Alfred weighs $59\frac{3}{4}$ lb., but according to his height and age he should weigh 71 lb. How much is he underweight?

4. Jim weighs $64\frac{3}{4}$ lb., and his brother weighs $94\frac{1}{2}$ lb. Their father weighs $178\frac{1}{2}$ lb. The father weighs how much more than the two boys together?

5. Margaret is $49\frac{3}{4}$ in. tall, and Joyce is $46\frac{3}{8}$ in. tall. Margaret is how much taller than Joyce?

6. What is the total weight of three loads of coal weighing $2\frac{3}{4}$ tons, $3\frac{1}{2}$ tons, and $2\frac{7}{8}$ tons?

7. The five boys on the Fulton School basketball team weigh 75 lb., 70 lb., 84 lb., 69 lb., and 77 lb. What is the average weight of the boys?

Sixth Self-Test

Mixed Test

Try to get the answers right the first time.

1.

450	969	478	607	431	853
789	94	586	394	878	598
866	786	31	690	44	749
54	537	45	775	969	98
372	874	259	19	326	764
185	976	420	636	689	675

2.

22358	87573	43015	68312	83704
−16377	−29047	−34368	−45618	−76695

3.

92863	34060	67725	72692	70001
−54964	−24172	−48089	−43749	−59899

4.

968	604	678	476	967	853
×87	×89	×89	×69	×46	×706

5. $6\overline{)5092}$ $8\overline{)3987}$ $7\overline{)6141}$ $9\overline{)6100}$ $4\overline{)3087}$

6. $7\overline{)3987}$ $5\overline{)1936}$ $8\overline{)5005}$ $3\overline{)2906}$ $7\overline{)6100}$

7. $4\overline{)7500}$ $8\overline{)3916}$ $6\overline{)5555}$ $9\overline{)5980}$ $4\overline{)7031}$

8. $11\overline{)4510}$ $84\overline{)4324}$ $69\overline{)2786}$ $22\overline{)1562}$

9. $73\overline{)2284}$ $54\overline{)4708}$ $29\overline{)2048}$ $92\overline{)5519}$

10.

$4\frac{2}{3}$	$5\frac{3}{4}$	$1\frac{4}{5}$	$6\frac{7}{8}$	$4\frac{5}{6}$	$3\frac{3}{8}$
$+3\frac{5}{6}$	$+2\frac{2}{3}$	$+3\frac{7}{10}$	$+2\frac{3}{4}$	$+3\frac{1}{2}$	$+1\frac{5}{16}$

11.

$6\frac{7}{5}$	$5\frac{1}{4}$	$2\frac{5}{8}$	$4\frac{1}{8}$	$3\frac{2}{3}$	$7\frac{5}{16}$
$-3\frac{3}{8}$	$-2\frac{3}{4}$	$-1\frac{1}{2}$	$-2\frac{2}{3}$	$-1\frac{5}{6}$	$-3\frac{5}{8}$

Problem Test

Write the answer to each problem.

1. Arthur weighs $84\frac{1}{2}$ lb., and Henry weighs $71\frac{3}{4}$ lb. Arthur is how much heavier than Henry?

2. I bought 2 dozen eggs at 30¢ a dozen. How much change should I get from $2?

3. After driving 80 miles on a trip of 200 miles, how long will it take to finish the trip at an average speed of 40 miles an hour?

4. Four girls gave a party. They paid $1.60 for ice cream and $2 for cake. What was each girl's share of the expenses?

5. Two boys started on a hike toward a small lake $12\frac{1}{2}$ miles away. After going $8\frac{1}{4}$ miles, how much farther did they still have to go?

6. A room is 15 feet long and 10 feet wide. How many feet is it around the room?

7. At 25¢ an hour, how much can Bob earn in 4 Saturdays, working 6 hours on each Saturday?

8. When milk sells at 10¢ a quart, what is the cost of 3 gallons of milk?

9. If I buy fruit for $1.25 and vegetables for $1.50, what change should I get from $5?

10. What is the cost of 2 pounds of round steak at 35¢ a pound and a pound of butter at 43¢?

11. Mrs. Ward had $9\frac{1}{4}$ yards of cloth. She used $4\frac{1}{2}$ yards for one dress and $4\frac{1}{4}$ yards for another. How much cloth did she have left?

12. Four boys at a camp rented a boat for 6 days at $1 per day. What was each boy's share of the rent?

Unit 25. More Addition and Subtraction of Fractions

Sight Problems

1. When apples sell at 4 for 10¢, how many apples can you buy for 20¢? for 30¢?

2. When pencils sell at 2 for 5¢, how many pencils can you buy for 25¢?

3. At 2 cans for 37¢, what do 4 cans of pears cost?

4. Bob had \$6 and spent \$2 of his money. What part of his money did he spend? What part did he have left?

5. Lucy used 4 eggs in a cake. What part of a dozen did she use?

6. When apples are selling at 2 for 7¢, how many apples should you get for 21¢?

7. Joyce practiced her music lesson for 45 min. What part of an hour did she practice?

8. If coal is selling at the rate of \$6.50 a ton, what is the cost of one-half ton of coal?

9. A \$30 overcoat was put on sale at a reduction of $\frac{1}{3}$. What was the sale price?

10. When 2 cans of peaches sell for 45¢, what is the price per can?

11. At 36¢ a yard, what will $\frac{1}{2}$ yard of ribbon cost? $\frac{1}{3}$ yd.? $\frac{1}{4}$ yd.?

12. Walter had 24 marbles. He gave $\frac{1}{3}$ of them to his brother. How many marbles did he have then?

13. At \$50 an acre, what is the cost of 50 acres of land?

Mixed Practice

Subtract the numbers below:

1. $\frac{11}{12} - \frac{3}{8}$ $\quad$ $\frac{4}{5} - \frac{7}{10}$ $\quad$ $\frac{1}{6} - \frac{1}{8}$ $\quad$ $\frac{3}{10} - \frac{1}{4}$ $\quad$ $\frac{3}{8} - \frac{3}{16}$ $\quad$ $\frac{11}{12} - \frac{7}{8}$ $\quad$ $\frac{5}{6} - \frac{2}{3}$ $\quad$ $\frac{4}{5} - \frac{3}{4}$

2. $12\frac{1}{8} - 3\frac{7}{12}$ $\quad$ $13\frac{1}{6} - 5\frac{1}{4}$ $\quad$ $8\frac{5}{8} - 3\frac{11}{12}$ $\quad$ $13\frac{3}{8} - 9\frac{5}{6}$ $\quad$ $12\frac{5}{6} - 2\frac{7}{8}$ $\quad$ $14\frac{1}{3} - 7\frac{7}{8}$ $\quad$ $27\frac{7}{8} - 12\frac{15}{16}$

3. $14\frac{3}{4} - 6\frac{5}{6}$ $\quad$ $11\frac{7}{8} - 7\frac{1}{12}$ $\quad$ $87\frac{1}{3} - 12\frac{5}{6}$ $\quad$ $23\frac{7}{8} - \frac{1}{2}$ $\quad$ $13\frac{2}{3} - 8\frac{1}{6}$ $\quad$ $84\frac{7}{16} - 68\frac{1}{8}$ $\quad$ $90\frac{1}{8} - 50\frac{7}{16}$

4. $73\frac{5}{8} - 49\frac{3}{16}$ $\quad$ $24 - 6\frac{2}{3}$ $\quad$ $18\frac{3}{4} - 4\frac{7}{8}$ $\quad$ $20\frac{7}{8} - 14\frac{11}{12}$ $\quad$ $9\frac{2}{3} - 5\frac{5}{12}$ $\quad$ $6\frac{3}{8} - 5\frac{1}{12}$ $\quad$ $17\frac{3}{5} - 9\frac{2}{3}$

Add the following:

5. $8\frac{1}{4} + 9\frac{1}{2}$ $\quad$ $7\frac{1}{8} + 6\frac{5}{6}$ $\quad$ $5\frac{3}{4} + 5\frac{5}{8}$ $\quad$ $8\frac{7}{12} + 8\frac{1}{8}$ $\quad$ $9\frac{1}{3} + 1\frac{1}{2}$ $\quad$ $6\frac{3}{4} + 5\frac{5}{6}$ $\quad$ $9\frac{2}{3} + 8\frac{3}{4}$

6. $4\frac{2}{3} + 5\frac{3}{9}$ $\quad$ $7\frac{2}{5} + 6\frac{1}{4}$ $\quad$ $5\frac{2}{3} + 6\frac{1}{2}$ $\quad$ $7\frac{1}{4} + 9\frac{3}{8}$ $\quad$ $3\frac{4}{5} + 2\frac{1}{2}$ $\quad$ $8\frac{2}{3} + 2\frac{5}{8}$ $\quad$ $1\frac{1}{2} + 7\frac{3}{5}$

7. $7\frac{1}{2} + 8\frac{1}{5} + 4\frac{3}{10}$ $\quad$ $8\frac{1}{4} + 6\frac{2}{3} + 7\frac{1}{2}$ $\quad$ $9\frac{1}{8} + 8\frac{5}{16} + 4\frac{1}{4}$ $\quad$ $8\frac{4}{9} + 7\frac{2}{3} + 4\frac{1}{2}$ $\quad$ $6\frac{3}{4} + 8\frac{1}{3} + 7\frac{5}{12}$ $\quad$ $3\frac{1}{3} + 5\frac{3}{8} + 6\frac{1}{12}$ $\quad$ $4\frac{1}{2} + 6\frac{7}{8} + 3\frac{3}{16}$

8. $4\frac{2}{5} + 9\frac{1}{2} + 8\frac{3}{5}$ $\quad$ $6\frac{2}{3} + 9\frac{1}{4} + 7\frac{5}{12}$ $\quad$ $7\frac{5}{6} + 5\frac{3}{4} + 4\frac{5}{8}$ $\quad$ $8\frac{1}{6} + 3\frac{2}{3} + 6\frac{5}{9}$ $\quad$ $7\frac{7}{10} + 4\frac{3}{4} + 9\frac{2}{5}$ $\quad$ $8\frac{3}{4} + 5\frac{2}{5} + 3\frac{3}{10}$ $\quad$ $4\frac{2}{3} + 7\frac{3}{8} + 2\frac{5}{12}$

Give answers for the following. Watch the signs.

9. $\frac{3}{4} - \frac{1}{5}$ $\quad$ $\frac{2}{3} + \frac{2}{5}$ $\quad$ $\frac{5}{8} - \frac{1}{3}$ $\quad$ $\frac{1}{4} + \frac{1}{12}$ $\quad$ $\frac{5}{12} - \frac{1}{6}$

10. $\frac{1}{2} + \frac{3}{8}$ $\quad$ $\frac{3}{4} - \frac{3}{16}$ $\quad$ $\frac{3}{5} + \frac{1}{2}$ $\quad$ $\frac{2}{3} - \frac{1}{5}$ $\quad$ $\frac{1}{2} + \frac{2}{3}$

Helping Mother with the Baking

Violet is helping her mother prepare for her brother's birthday party.

1. They are baking a cake, using twice the amount given in this recipe. How much of each item are they using?

$\frac{1}{2}$ cup butter	$1\frac{3}{4}$ cups flour
1 cup sugar	2 teaspoons baking powder
2 eggs	$\frac{1}{2}$ cup milk

2. How much of each item will they need if they double the following recipe for making peanut candy?

$1\frac{1}{2}$ cups sugar	$1\frac{1}{2}$ lb. peanuts
$\frac{3}{4}$ cup corn sirup	1 tablespoon soda
$\frac{1}{3}$ cup butter	$1\frac{1}{2}$ cups water

3. Violet wishes to bake some cookies. She will use three times the amounts called for in the recipe. How much of each of the following items should she use?

$\frac{1}{3}$ lb. butter	$\frac{1}{2}$ c. brown sugar	$\frac{1}{3}$ c. nut meats
$2\frac{1}{2}$ c. flour	$\frac{1}{2}$ c. white sugar	$\frac{1}{4}$ teaspoon cloves
1 egg	1 teaspoon cinnamon	1 teaspoon soda

Can You Answer this Question?

1. Violet bought a mixing bowl and a spoon for $1.20. The cost of the bowl was $1 more than the cost of the spoon. How much did the spoon cost?

Addition and Subtraction of Fractions

Subtract the numbers below:

1.

$\frac{5}{8}$	$\frac{2}{3}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{5}{8}$
$\frac{5}{16}$	$\frac{2}{9}$	$\frac{3}{16}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{3}{4}$	$\frac{5}{12}$

2.

$14\frac{3}{8}$	$15\frac{7}{9}$	$16\frac{1}{2}$	$26\frac{7}{16}$	$97\frac{1}{4}$	$14\frac{1}{4}$
$5\frac{1}{2}$	$8\frac{2}{3}$	$6\frac{5}{6}$	$17\frac{1}{4}$	$59\frac{7}{8}$	$4\frac{2}{3}$

3.

$\frac{5}{6}$	$\frac{3}{5}$	$\frac{8}{9}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$
$\frac{4}{9}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{7}{16}$	$\frac{5}{12}$	$\frac{2}{5}$	$\frac{1}{6}$	$\frac{3}{4}$

4.

$13\frac{1}{6}$	$27\frac{1}{6}$	$30\frac{5}{8}$	$41\frac{2}{3}$	$17\frac{3}{4}$	$22\frac{7}{10}$
$9\frac{5}{12}$	$19\frac{3}{4}$	$9\frac{2}{3}$	$27\frac{5}{12}$	$15\frac{4}{5}$	$15\frac{3}{4}$

Add the following:

5.

$\frac{3}{4}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{6}$	$\frac{2}{3}$	$\frac{5}{12}$
$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{4}{9}$	$\frac{7}{12}$

6.

8	5	$6\frac{4}{5}$	$4\frac{5}{8}$	$8\frac{5}{6}$	$7\frac{4}{9}$	$2\frac{9}{16}$
$\frac{3}{4}$	$3\frac{2}{3}$	$2\frac{4}{5}$	$6\frac{1}{12}$	$4\frac{5}{6}$	$3\frac{5}{9}$	$3\frac{3}{16}$

7.

$\frac{3}{4}$	$\frac{1}{3}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{15}{16}$	$\frac{1}{2}$	$\frac{3}{4}$
$\frac{2}{3}$	$\frac{3}{8}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{1}{9}$	$\frac{2}{5}$

Problems

1. A farmer sold 76 calves for $1406. Find the average price per calf.

2. At $10 a ton, what is the cost of two loads of coal, one weighing $2\frac{1}{2}$ tons and the other $1\frac{3}{4}$ tons?

3. If a man earns 95¢ an hour, how much will he earn in 18 weeks of 44 hours each?

Practice in Subtraction of Fractions

1.	$4\frac{1}{6}$	$6\frac{1}{2}$	$5\frac{3}{8}$	$7\frac{1}{4}$	$3\frac{3}{8}$	$4\frac{1}{2}$	$7\frac{3}{4}$
	$1\frac{5}{8}$	$4\frac{1}{3}$	$3\frac{1}{3}$	$1\frac{5}{6}$	$1\frac{2}{3}$	$2\frac{4}{5}$	$4\frac{3}{10}$
2.	$4\frac{1}{3}$	$7\frac{1}{4}$	$4\frac{5}{6}$	$8\frac{3}{4}$	$4\frac{2}{3}$	$5\frac{3}{8}$	$7\frac{2}{5}$
	$2\frac{1}{2}$	$2\frac{2}{3}$	$2\frac{3}{4}$	$7\frac{2}{3}$	$1\frac{1}{2}$	$2\frac{5}{6}$	$3\frac{1}{2}$
3.	$7\frac{1}{6}$	$6\frac{1}{3}$	$4\frac{3}{4}$	$6\frac{1}{6}$	$9\frac{2}{3}$	$6\frac{2}{5}$	$4\frac{4}{5}$
	$2\frac{1}{8}$	$1\frac{3}{4}$	$3\frac{1}{2}$	$1\frac{1}{4}$	$6\frac{3}{8}$	$3\frac{2}{3}$	$2\frac{1}{4}$
4.	$2\frac{1}{5}$	$8\frac{5}{6}$	$6\frac{1}{2}$	$8\frac{1}{12}$	$5\frac{1}{2}$	$6\frac{3}{4}$	$7\frac{3}{4}$
	$1\frac{1}{2}$	$3\frac{7}{8}$	$2\frac{3}{5}$	$6\frac{1}{8}$	$3\frac{2}{3}$	$4\frac{7}{8}$	$5\frac{5}{6}$
5.	$4\frac{3}{4}$	$7\frac{1}{3}$	$8\frac{1}{4}$	$3\frac{1}{6}$	$4\frac{2}{3}$	$8\frac{3}{8}$	$9\frac{1}{2}$
	$2\frac{3}{5}$	$4\frac{1}{5}$	$5\frac{1}{3}$	$1\frac{1}{9}$	$1\frac{5}{6}$	$6\frac{1}{6}$	$4\frac{4}{5}$

Problems on Wages

Write A, S, M, or D for each step. Solve the problems.

1. Alfred earned 50¢ and decided to spend all but $\frac{1}{5}$ of it. How much did he spend?

2. Walter worked 4 hours picking berries and received 72¢. How much did he earn an hour?

3. A man who earns $4.90 per day was laid off for 3 days. How much did he lose by being idle?

4. At a salary of $165 a month, how much would a man earn in 7 months?

5. At a salary of $2100 a year, how much does a man earn a month?

6. A man has a salary of $2750 a year. If he saves one fifth of his salary, how much does he spend?

Practice in Subtraction

1.

$3\frac{1}{3}$	$5\frac{5}{8}$	$9\frac{1}{8}$	$5\frac{5}{8}$	$4\frac{7}{10}$	$5\frac{5}{8}$	$3\frac{2}{3}$
$1\frac{5}{6}$	$2\frac{5}{6}$	$3\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{3}{4}$	$3\frac{1}{3}$	$1\frac{1}{5}$

2.

$6\frac{1}{2}$	$5\frac{3}{16}$	$3\frac{5}{12}$	$7\frac{3}{4}$	$4\frac{5}{12}$	$6\frac{1}{4}$	$8\frac{3}{8}$
$4\frac{7}{12}$	$2\frac{1}{4}$	$2\frac{7}{8}$	$4\frac{5}{16}$	$2\frac{7}{8}$	$3\frac{9}{10}$	$5\frac{9}{16}$

3.

10	16	$9\frac{5}{6}$	$11\frac{7}{8}$	$8\frac{1}{8}$	$20\frac{7}{9}$	13
$6\frac{2}{3}$	$9\frac{3}{8}$	$5\frac{5}{6}$	6	$4\frac{5}{8}$	$7\frac{1}{9}$	$6\frac{5}{12}$

4. $1\frac{1}{4}-\frac{1}{2}$ $\quad 1\frac{5}{6}-\frac{2}{3}$ $\quad 2\frac{7}{8}-1\frac{1}{3}$ $\quad 4\frac{1}{2}-1\frac{7}{10}$

5. $1\frac{1}{2}-1\frac{2}{5}$ $\quad 2\frac{1}{5}-1\frac{1}{4}$ $\quad 3\frac{3}{8}-1\frac{1}{12}$ $\quad 4\frac{1}{4}-1\frac{1}{3}$

6. $3\frac{3}{4}-1\frac{2}{5}$ $\quad 4\frac{1}{2}-1\frac{1}{9}$ $\quad 3\frac{1}{6}-1\frac{3}{8}$ $\quad 5\frac{1}{10}-2\frac{1}{5}$

Problems

1. Mr. Allen's rate of pay was raised from 70¢ an hour to 75¢ an hour. The raise will add how much to his earnings in 4 weeks of 40 hours each?

2. A remnant of 6 yards of cloth is on sale for $2.58. What is the price per yard?

3. A carpenter worked 4 da. one week, $6\frac{1}{2}$ da. the next week, $5\frac{1}{2}$ da. the third week, and 3 da. the fourth week. At $9.50 a day, how much did he earn?

4. At $27 a head, how many head of calves can a man buy for $1350?

5. How much does a man earn a month if his salary is $1800 a year?

6. A boy earned $3.75, $2.55, and $1.35 in three weeks. What were his average earnings per week?

Unit 26. Multiplication of Fractions

Multiplying Fractions and Whole Numbers

1. You already know that $\frac{1}{2}$ of $4 = 2$. $\frac{1}{2} \times 4$ is the same as $\frac{1}{2}$ of 4. Show on your ruler that $\frac{1}{2} \times 4$ in. $= 2$ in. and $\frac{1}{2} \times 6$ in. $= 3$ in.

2. How much is $4 \times \frac{1}{2}$? $4 \times \frac{1}{2} = \frac{4}{2} = 2$. Show on your ruler that $4 \times \frac{1}{2}$ in. $= 2$ in.

3. Show that $8 \times \frac{1}{2}$ in. $= 4$ in., and $\frac{1}{2} \times 8$ in. $= 4$ in.

Give the products of the following:

4.	$\frac{1}{3} \times 9$	$\frac{1}{4} \times 8$	$\frac{1}{2} \times 10$	$\frac{1}{3} \times 12$	$\frac{1}{4} \times 12$
5.	$12 \times \frac{1}{2}$	$15 \times \frac{1}{3}$	$20 \times \frac{1}{2}$	$18 \times \frac{1}{3}$	$15 \times \frac{1}{5}$
6.	$\frac{1}{5} \times 10$	$16 \times \frac{1}{4}$	$\frac{1}{6} \times 12$	$14 \times \frac{1}{2}$	$\frac{1}{7} \times 14$

7. $\frac{3}{4} \times 8$. Think $\frac{3}{4} \times 8 = \frac{24}{4} = 6$.

8. $8 \times \frac{3}{4}$. Think $8 \times \frac{3}{4} = \frac{24}{4} = 6$.

$\frac{3}{\cancel{4}_{1}} \times \cancel{8}^{2} = 6$

$\cancel{8}^{2} \times \frac{3}{\cancel{4}_{1}} = 6$

Multiplying $\frac{3}{4}$ by 8 or 8 by $\frac{3}{4}$ may be shortened by **cancellation**, that is, by dividing the whole number and the denominator of the fraction by the same number. Both 8 and 4 can be divided by 4. Draw lines through 8 and 4 as shown. Think $4 \div 4 = 1$. Write 1. Think $8 \div 4 = 2$. Write 2. Think $3 \times 2 = 6$.

9.	$\frac{1}{5} \times 15$	$\frac{2}{3} \times 12$	$\frac{3}{4} \times 12$	$\frac{3}{5} \times 10$	$\frac{2}{7} \times 14$
10.	$16 \times \frac{3}{8}$	$12 \times \frac{5}{6}$	$20 \times \frac{3}{4}$	$24 \times \frac{2}{3}$	$15 \times \frac{3}{5}$
11.	$\frac{2}{3} \times 9$	$24 \times \frac{7}{8}$	$\frac{5}{6} \times 30$	$42 \times \frac{3}{7}$	$\frac{5}{6} \times 36$
12.	$\frac{3}{4} \times 4$	$\frac{2}{5} \times 15$	$\frac{4}{5} \times 10$	$\frac{3}{8} \times 4$	$\frac{5}{6} \times 6$

Multiplication of Fractions

1. A gardener has 16 plants which he wishes to place in a row along a wall. Each plant requires $\frac{5}{12}$ ft. How much space along the wall will the plants require?

Multiply $\frac{5}{12}$ by 16. Cancel 4 from 16 and 12. Write 4 above 16 and 3 below 12. Think $5 \times 4 = 20$. Write 3 under 20. Change $\frac{20}{3}$ to $6\frac{2}{3}$.

$$\overset{4}{\cancel{16}} \times \frac{5}{\cancel{12}_{3}} = \frac{20}{3} = 6\frac{2}{3}$$

2. Study each example below:

$$\overset{7}{\cancel{21}} \times \frac{5}{\cancel{6}_{2}} = \frac{35}{2} = 17\frac{1}{2} \qquad \cancel{8} \times \frac{1}{\cancel{16}_{2}} = \frac{1}{2} \qquad \frac{5}{\cancel{8}} \times \cancel{6} = 5$$

Multiply the following:

3. $\frac{3}{4} \times 16$ $\quad \frac{2}{3} \times 27$ $\quad \frac{1}{8} \times 12$ $\quad \frac{7}{8} \times 10$ $\quad \frac{4}{5} \times 25$

4. $27 \times \frac{8}{9}$ $\quad 8 \times \frac{3}{8}$ $\quad 4 \times \frac{3}{4}$ $\quad 5 \times \frac{4}{5}$ $\quad 18 \times \frac{4}{9}$

5. $\frac{3}{7} \times 14$ $\quad \frac{3}{5} \times 15$ $\quad \frac{5}{8} \times 12$ $\quad \frac{5}{6} \times 16$ $\quad \frac{5}{6} \times 12$

Sight Problems

1. What is the cost of 8 pieces of crayon at $\frac{1}{2}¢$ each?

2. How many minutes are there in $\frac{3}{4}$ of an hour?

3. If $\frac{3}{4}$ of a yard of linen is used for each towel, how many yards of linen will be needed for a dozen towels?

4. At 24¢ a yard, what is the cost of $\frac{5}{8}$ yd. of ribbon?

5. At 48¢ a pound, what does $\frac{7}{8}$ lb. of ham cost?

6. If Bob earns $\frac{1}{4}$ of a dollar an hour, how much will he earn in 36 hours?

7. Jerry lives $\frac{3}{4}$ mi. from school. How many miles does he walk in a week if he makes 10 trips?

Multiplication of Fractions

1. The railroad station at Jackson is $\frac{3}{5}$ mi. from Newbury Junction. How many miles is the round trip between the two stations?

$$2 \times \frac{3}{5} = \frac{6}{5} = 1\frac{1}{5}$$

Multiply $\frac{3}{5}$ by 2. Think $2 \times \frac{3}{5} = \frac{6}{5}$. Change $\frac{6}{5}$ to $1\frac{1}{5}$.

2. Multiply 18 by $\frac{7}{10}$.

$$\frac{7}{\cancel{10}_{5}} \times \cancel{18}^{9} = \frac{63}{5} = 12\frac{3}{5}$$

Cancel 2 from 18 and 10. Multiply 7 by 9. Write $\frac{63}{5} = 12\frac{3}{5}$.

Multiply the following. Cancel when possible.

3.	$2 \times \frac{1}{3}$	$3 \times \frac{1}{4}$	$4 \times \frac{1}{3}$	$5 \times \frac{2}{3}$
4.	$\frac{1}{4} \times 9$	$\frac{2}{3} \times 7$	$\frac{1}{2} \times 11$	$\frac{2}{5} \times 6$
5.	$\frac{3}{4} \times 5$	$\frac{3}{8} \times 9$	$\frac{2}{3} \times 8$	$\frac{4}{5} \times 10$
6.	$\frac{2}{3} \times 16$	$\frac{3}{4} \times 14$	$\frac{4}{5} \times 15$	$\frac{1}{8} \times 11$
7.	$20 \times \frac{1}{6}$	$17 \times \frac{1}{4}$	$18 \times \frac{5}{6}$	$21 \times \frac{6}{7}$
8.	$13 \times \frac{3}{4}$	$14 \times \frac{5}{6}$	$9 \times \frac{5}{8}$	$14 \times \frac{5}{7}$
9.	$15 \times \frac{3}{8}$	$27 \times \frac{4}{9}$	$21 \times \frac{2}{9}$	$16 \times \frac{3}{10}$

Find the answers to the following. The word **of** means **times** in such statements as $\frac{2}{3}$ of $4 = 2\frac{2}{3}$.

10.	$\frac{1}{2}$ of 5	$\frac{1}{2}$ of 7	$\frac{1}{2}$ of 9	$\frac{1}{2}$ of 11
11.	$\frac{2}{3}$ of 6	$\frac{2}{3}$ of 10	$\frac{2}{3}$ of 9	$\frac{2}{3}$ of 3
12.	$\frac{1}{4}$ of 5	$\frac{1}{4}$ of 7	$\frac{1}{4}$ of 10	$\frac{1}{4}$ of 3
13.	$\frac{3}{4}$ of 3	$\frac{3}{4}$ of 9	$\frac{3}{4}$ of 6	$\frac{3}{4}$ of 11
14.	$\frac{1}{5}$ of 4	$\frac{1}{5}$ of 7	$\frac{1}{5}$ of 9	$\frac{1}{5}$ of 8
15.	$\frac{1}{6}$ of 5	$\frac{1}{6}$ of 7	$\frac{1}{6}$ of 8	$\frac{1}{6}$ of 9

Multiplying Whole Numbers and Mixed Numbers

1. At $12\frac{1}{2}¢$ a can, what is the cost of 8 cans of corn?

Think $8 \times \frac{1}{2} = 4$. Write 4. Multiply 12 by 8. Write 96. Add 96 and 4. The cost is $1.00.

$$\begin{array}{r} \$.12\frac{1}{2} \\ 8 \\ \hline 4 \\ 96 \\ \hline \$1.00 \end{array}$$

2. Multiply 54 by $7\frac{1}{3}$.

Think $\frac{1}{3} \times 54 = 18$. Write 18. Multiply 54 by 7. Add 378 and 18. Write 396.

3. Multiply 48 by $9\frac{2}{3}$.

Think $\frac{2}{3} \times 48 = 32$. Write 32. Multiply 48 by 9. Write 432. Add 432 and 32. The answer is 464.

$$\begin{array}{r} 48 \\ 9\frac{2}{3} \\ \hline 32 \\ 432 \\ \hline 464 \end{array}$$

4. Find the area of a rug $10\frac{3}{4}$ ft. by 16 ft.

5. A rod is $16\frac{1}{2}$ ft. Forty rods are how many feet?

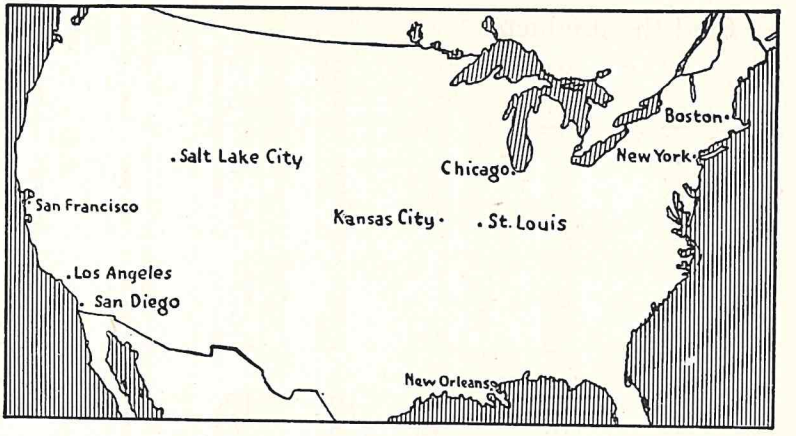
6. A rod is $5\frac{1}{2}$ yd. Change 150 rods to yards.

7. Find the area of a walk $5\frac{1}{2}$ ft. wide and 150 ft. long.

Multiply the numbers below:

8.	$46 \times 9\frac{1}{2}$	$69 \times 6\frac{1}{3}$	$86 \times 5\frac{1}{2}$	$45 \times 9\frac{1}{9}$	$96 \times 3\frac{1}{6}$	$76 \times 9\frac{1}{4}$
9.	$75 \times 7\frac{1}{5}$	$96 \times 3\frac{1}{8}$	$27 \times 7\frac{2}{3}$	$54 \times 7\frac{2}{9}$	$28 \times 7\frac{2}{7}$	$45 \times 3\frac{3}{5}$
10.	$96\frac{1}{2} \times 4$	$76\frac{1}{2} \times 8$	$97\frac{1}{3} \times 6$	$20\frac{1}{3} \times 9$	$64\frac{2}{3} \times 9$	$89\frac{2}{5} \times 5$
11.	$49\frac{5}{7} \times 7$	$40 \times 9\frac{5}{8}$	$57\frac{2}{3} \times 9$	$45 \times 6\frac{5}{9}$	$78\frac{3}{4} \times 8$	$15 \times 8\frac{2}{3}$

Air Distances



The above map is **drawn to scale;** that is, a certain distance on the map is equal to a certain number of miles. On this map each inch represents a distance of 800 miles. In answering the following questions you will find it necessary to use your ruler.

1. One-half inch on the map represents how many miles?

2. One-eighth inch represents how many miles?

3. The distance on the map between Los Angeles and San Francisco is how many inches?

4. How far is it from New York to Boston?

5. If a plane flies from San Diego to Salt Lake City in 4 hours, how many miles per hour does it average?

6. A plane flying from Chicago to New Orleans was forced down after it had covered $\frac{1}{3}$ the distance. How many miles had it covered?

7. How far does a plane fly in going from New York to Kansas City by way of St. Louis?

Practice in Fractions

Find the products.

1.	$2\frac{1}{2}$ × 2	$3\frac{3}{4}$ × 8	$8\frac{2}{3}$ × 6	$5\frac{1}{2}$ × 6	$3\frac{4}{5}$ × 5	$9\frac{2}{3}$ × 9	$5\frac{1}{5}$ × 10
2.	$8\frac{3}{4}$ × 4	$6\frac{3}{8}$ × 4	$5\frac{7}{8}$ × 8	$3\frac{1}{3}$ × 3	$5\frac{1}{4}$ × 4	$6\frac{1}{2}$ × 4	$10\frac{1}{2}$ × 10
3.	6 × $5\frac{5}{6}$	8 × $2\frac{1}{4}$	7 × $6\frac{4}{7}$	9 × $7\frac{1}{3}$	12 × $3\frac{1}{3}$	16 × $2\frac{3}{8}$	12 × $2\frac{2}{3}$
4.	6 × $5\frac{2}{3}$	4 × $3\frac{1}{2}$	7 × $2\frac{3}{7}$	12 × $2\frac{1}{6}$	18 × $2\frac{2}{3}$	10 × $5\frac{2}{5}$	15 × $1\frac{3}{5}$
5.	16 × $3\frac{7}{8}$	20 × $5\frac{3}{10}$	24 × $7\frac{5}{8}$	42 × $4\frac{1}{6}$	25 × $1\frac{3}{5}$	30 × $2\frac{1}{5}$	16 × $2\frac{3}{4}$
6.	$1\frac{1}{2}\times 6$	$2\frac{1}{2}\times 4$	$3\times 1\frac{1}{3}$	$1\frac{2}{3}\times 6$			
7.	$1\frac{1}{4}\times 8$	$2\frac{1}{2}\times 10$	$4\times 4\frac{1}{2}$	$2\frac{1}{5}\times 5$			
8.	$2\times 4\frac{1}{4}$	$8\times 1\frac{3}{8}$	$4\times 5\frac{3}{4}$	$6\times 1\frac{1}{6}$			

Add the two fractions in each pair below. Then subtract the smaller from the larger.

9.	$\frac{1}{2}$ $\frac{1}{3}$	$\frac{1}{3}$ $\frac{1}{5}$	$\frac{1}{3}$ $\frac{1}{12}$	$\frac{1}{4}$ $\frac{1}{5}$	$\frac{1}{4}$ $\frac{1}{8}$		
10.	$\frac{2}{9}$ $\frac{1}{9}$	$\frac{2}{3}$ $\frac{1}{3}$	$\frac{1}{3}$ $\frac{1}{4}$	$\frac{3}{8}$ $\frac{1}{2}$	$\frac{3}{8}$ $\frac{5}{8}$		
11.	$\frac{2}{3}$ $\frac{1}{12}$	$\frac{1}{6}$ $\frac{1}{8}$	$\frac{1}{2}$ $\frac{1}{8}$	$\frac{1}{3}$ $\frac{1}{9}$	$\frac{1}{4}$ $\frac{1}{6}$		
12.	$\frac{2}{5}$ $\frac{1}{4}$	$\frac{3}{4}$ $\frac{1}{8}$	$\frac{2}{3}$ $\frac{1}{6}$	$\frac{3}{4}$ $\frac{1}{2}$	$\frac{5}{6}$ $\frac{1}{3}$		
13.	$\frac{1}{5}$ $\frac{1}{10}$	$\frac{3}{4}$ $\frac{1}{6}$	$\frac{7}{8}$ $\frac{1}{2}$	$\frac{2}{3}$ $\frac{1}{2}$	$\frac{5}{8}$ $\frac{1}{4}$		
14.	$\frac{1}{5}$ $\frac{4}{5}$	$\frac{1}{2}$ $\frac{1}{5}$	$\frac{1}{8}$ $\frac{1}{3}$	$\frac{3}{4}$ $\frac{5}{8}$	$\frac{2}{9}$ $\frac{1}{3}$		

Unit 27. Formulas

The Value of Formulas

A **formula** is a short statement of a **rule.** Compare the formula with the rule for finding cost.

Rule: To find the cost of several articles, multiply the price by the number of articles.

Formula: Number of articles × price = cost.

1. Do the rule and the formula mean the same? Which is easier to use and to remember?

2. You have already used the formulas below for solving problems. Write in your own words the meaning of the three formulas in each group.

No. articles × price = cost	**Length × width = area**
Cost ÷ price = no. articles	**Area ÷ length = width**
Cost ÷ no. articles = price	**Area ÷ width = length**
Speed × time = distance	**Rate of pay × time = earnings**
Distance ÷ time = speed	**Earnings ÷ time = rate of pay**
Distance ÷ speed = time	**Earnings ÷ rate of pay = time**

Give the missing numbers.

3. Length = 3 ft., width = 2 ft., area = ___

4. Number = 6, price = \$3, cost = ___

5. Area = 72 sq. in., length = 9 in., width = ___

6. Cost = 60¢, price = 15¢, number = ___

7. Speed = 40 mi., time = 3 hr., distance = ___

8. Rate of pay = 90¢, time = 8 hr., earnings = ___

9. Distance = 48 mi., time = 3 hr., speed = ___

10. Earnings = \$120, time = 4 wk., rate of pay = ___

Problems to Think Through

Decide the facts and find the question. Write the formula to use in answering the question.

1. If you know the length and width of a floor, how do you find the area?

2. When you know the price of a pound of coffee, how do you find the cost of several pounds?

3. If a problem tells you the speed of a train and the distance traveled, how do you find the time?

4. If you know the cost of a dozen oranges, how do you find the price of one orange?

5. If you know a man's salary for a year, how do you find his salary per month?

6. How do you find the speed of a ship when you know the distance and the time?

7. If you know the length and the area of a floor, how do you find the width?

8. If you know how much a man earned in a number of days, how do you find his rate of pay per day?

9. When you know the price of an article, how do you find the number you can buy with the money you have?

10. When you know the speed of an auto and the time it travels, how do you find the distance?

11. If you know how much a man earns per hour, and the number of hours he works, how do you find his earnings?

12. When the area and the width of a basement are given, how do you find the length?

13. A man is paid a sum of money for working a certain number of hours. How can you find the rate per hour?

Writing Formulas for Problems

Write the formula for each problem. Find the answers.

1. At 6¢ per pound, what is the cost of 24 pounds of nails? (Number × price = cost)

2. When the price is 25¢ per can, how many cans of peaches can you buy for $1.50?

3. At an average speed of 20 miles per hour, how far will a ship sail in 24 hours?

4. At $15 per week, what will a man earn in 40 weeks?

5. How many square feet are there in the area of a football field 300 ft. long and 160 ft. wide?

6. At 20 lb. for a dollar, what is the price of a pound of sugar?

7. What is the area of a rug 8 ft. by $10\frac{1}{2}$ ft.?

Measures

Find the missing numbers.

1.	1 gal. = ___ qt.	$\frac{1}{2}$ gal. = ___ qt.	$\frac{1}{4}$ gal. = ___ qt.
2.	$\frac{3}{4}$ gal. = ___ qt.	4 qt. = ___ gal.	2 qt. = ___ gal.
3.	1 qt. = ___ gal.	3 qt. = ___ gal.	1 bu. = ___ pk.
4.	$\frac{1}{2}$ bu. = ___ pk.	$\frac{1}{4}$ bu. = ___ pk.	$\frac{3}{4}$ bu. = ___ pk.
5.	1 ft. = ___ in.	$\frac{1}{4}$ ft. = ___ in.	$1\frac{1}{2}$ ft. = ___ in.
6.	$\frac{1}{2}$ ft. = ___ in.	$1\frac{1}{4}$ ft. = ___ in.	$\frac{3}{4}$ ft. = ___ in.
7.	$1\frac{3}{4}$ ft. = ___ in.	$\frac{1}{3}$ ft. = ___ in.	$1\frac{1}{3}$ ft. = ___ in.
8.	$\frac{2}{3}$ ft. = ___ in.	$1\frac{2}{3}$ ft. = ___ in.	$\frac{1}{6}$ ft. = ___ in.
9.	$1\frac{1}{6}$ ft. = ___ in.	$\frac{5}{6}$ ft. = ___ in.	$1\frac{5}{6}$ ft. = ___ in.
10.	$\frac{1}{12}$ ft. = ___ in.	$1\frac{1}{12}$ ft. = ___ in.	$\frac{5}{12}$ ft. = ___ in.
11.	$1\frac{5}{12}$ ft. = ___ in.	$\frac{7}{12}$ ft. = ___ in.	$1\frac{7}{12}$ ft. = ___ in.

Sight Problems

1. At 36¢ per pound, what do $1\frac{1}{2}$ lb. of steak cost?

2. At $6\frac{1}{4}$¢ a bar, what is the cost of 4 bars of soap?

3. At $8\frac{1}{3}$¢ per can, what is the cost of 6 cans of vegetable soup?

4. At $12\frac{1}{2}$¢ per can, what do 4 cans of corn cost?

5. Mildred practices her music lesson $\frac{1}{2}$ hour a day. How many hours will she practice in 5 days?

6. At 40¢ per yard, what is the cost of $4\frac{3}{4}$ yards of dress goods?

7. How many feet of molding will be needed to go around a room $12\frac{1}{2}$ feet long and 10 feet wide?

8. At 10¢ per yard, what is the cost of $4\frac{1}{2}$ yards of ribbon?

9. Using $\frac{5}{6}$ of a yard for each towel, how many yards of linen will be needed for 6 towels?

10. A peck of potatoes weighs 15 pounds. Ten pounds of potatoes is what part of a peck?

11. How many inches are there in $2\frac{1}{4}$ feet?

12. How many square feet are there in the top of a table 4 feet long and $2\frac{1}{2}$ feet wide?

13. At 36¢ per pound, what is the cost of $1\frac{1}{4}$ pounds of ham?

14. Jerry worked in a grocery store $\frac{1}{2}$ hour each day for 12 days. At 20¢ an hour, how much did he get for his work?

15. What is the cost of $\frac{1}{4}$ lb. of butter at the rate of 40¢ a pound and $\frac{1}{2}$ doz. lemons at 48¢ a dozen?

Measures

Find the missing numbers.

1.	$\frac{1}{12}$ ft. = ___ in.	$1\frac{1}{12}$ ft. = ___ in.	$2\frac{3}{4}$ ft. = ___ in.
2.	1 lb. = ___ oz.	$\frac{1}{2}$ lb. = ___ oz.	$\frac{1}{4}$ lb. = ___ oz.
3.	$\frac{3}{4}$ lb. = ___ oz.	$\frac{1}{8}$ lb. = ___ oz.	$\frac{3}{8}$ lb. = ___ oz.
4.	$\frac{5}{8}$ lb. = ___ oz.	$\frac{7}{8}$ lb. = ___ oz.	$\frac{1}{16}$ lb. = ___ oz.
5.	$\frac{3}{16}$ lb. = ___ oz.	$\frac{5}{16}$ lb. = ___ oz.	$\frac{7}{16}$ lb. = ___ oz.
6.	8 oz. = ___ lb.	4 oz. = ___ lb.	2 oz. = ___ lb.
7.	32 oz. = ___ lb.	12 oz. = ___ lb.	48 oz. = ___ lb.
8.	6 in. = ___ ft.	3 in. = ___ ft.	9 in. = ___ ft.
9.	36 in. = ___ yd.	12 in. = ___ yd.	4 in. = ___ yd.
10.	6 in. = ___ yd.	18 in. = ___ yd.	24 in. = ___ yd.
11.	27 in. = ___ yd.	30 in. = ___ yd.	20 in. = ___ yd.

Problem Practice

1. Jim received \$2 for 8 hours' work. What was his rate of pay per hour?

2. A room is 15 ft. long. How wide must the room be to contain an area of 195 sq. ft.?

3. An airplane flew 800 miles in 5 hours. What was its average speed?

4. At \$120 per month, how long will a man have to work to earn \$600?

5. At a speed of 45 miles per hour, how long will it take to drive an auto 180 miles?

6. How wide is a room, 40 feet long, having an area of 1000 square feet?

7. When prunes are sold at 4 lb. for 25¢, what is the price per pound?

Sight Problems

1. The total weight of 4 bass was 5 pounds. What was their average weight?

2. What is the area of a floor $12\frac{1}{2}$ feet long and 10 feet wide?

3. At \$4 a gross, what is the cost of $1\frac{1}{4}$ gross of pencils?

4. How many acres are there in a park 20 rods long and 16 rods wide?

5. How many rods of fencing will be needed to fence a field 25 rods long and 15 rods wide?

6. Henry weighs $71\frac{3}{4}$ lb., and Harold weighs 80 lb. What is the sum of their weights?

7. At \$2 per square yard, what is the cost of a carpet 4 yards long and 3 yards wide?

8. At 8¢ per square foot, what will it cost to sod a lawn 60 feet long and 50 feet wide?

9. Eggs sell at 30¢ a dozen. What does 1 egg cost?

10. When ribbon sells at 30¢ per yard, what is the cost of 12 inches of ribbon?

11. How many tons of coal are there in 7,000 lb.?

12. How many yards are there in two pieces of cloth, one $1\frac{1}{2}$ yards and the other $2\frac{1}{4}$ yards?

13. Harold weighs 80 lb., and Ed weighs $74\frac{3}{4}$ lb. What is the difference in their weights?

14. At 40¢ a pound, find the cost of $3\frac{3}{8}$ lb. of beef.

15. At $1\frac{1}{4}$ yards for one apron, how many yards of goods are needed for 4 aprons?

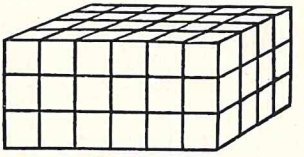
Unit 28. Cubic Measure

Measures of Volume

A block 1 inch long, 1 inch wide, and 1 inch high is a **cubic inch.** Such a block is called an **inch cube.** Its **volume** is 1 cubic inch.

1×1×1

1. Walter has a small coin box with inside dimensions of 3 in., 6 in., and 4 in. What is its volume?



3×6×4

Walter's box will hold 3 layers of inch cubes. Each layer contains 24 inch cubes (6×4). The volume of his box = 3×6×4 in. It has three dimensions: length, width, and height. To find its volume, we must know its three inside dimensions.

Length × width × height = volume

2. Henry has two boxes. One box is 7 in. long, 4 in. wide, and 3 in. deep. The other box is 8 in. long, 5 in. wide, and 2 in. deep. Which is the larger box?

3. How many cubic inches are there in the volume of a box 6 in. long, 6 in. wide, and 6 in. deep?

4. Find the number of cubic inches in a hat box 12 in. long, 12 in. wide, and 12 in. deep.

5. How many cubic inches are there in an ice tray 10 in. long, 3 in. wide, and 1 in. deep?

6. The inside dimensions of a box are: length, 9 in.; width, 5 in.; and depth, 2 in. Find the volume.

Mixed Practice

Add. Check your answers.

1.	\$9.58	849	6237	8585	24007
	5.27	226	2478	4278	10406
	2.84	457	6070	8479	4070
	1.98	746	875	7006	13568
	4.56	898	4004	2379	49873
	3.57	767	7318	568	7476

Subtract the numbers below. Prove your answers.

2.	\$70.57	9839	7485	91647	56
	36.79	6275	2876	30868	29
3.	\$71.53	8158	9223	92304	81
	57.86	6067	7769	41335	28

Multiply the following:

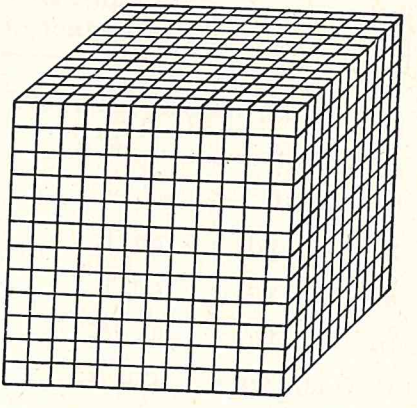
4.	$\frac{3}{4}\times 8$	$\frac{2}{3}\times 5$	$6\times 1\frac{1}{3}$	$8\times\frac{2}{5}$	$\frac{7}{8}\times 5$
5.	$\frac{3}{4}\times 9$	$12\times\frac{4}{5}$	$\frac{3}{4}\times 7$	$9\times\frac{7}{8}$	$21\times 4\frac{2}{3}$
6.	$\frac{4}{5}\times 15$	$2\frac{1}{2}\times 9$	$2\frac{2}{3}\times 9$	$12\times 3\frac{1}{3}$	$19\times 6\frac{1}{2}$
7.	$4\times 1\frac{1}{4}$	$9\times 6\frac{2}{3}$	$4\frac{7}{8}\times 24$	$2\frac{3}{5}\times 11$	$5\frac{3}{4}\times 30$
8.	$3\frac{3}{8}\times 20$	$14\times 3\frac{1}{3}$	$1\frac{2}{3}\times 7$	$\frac{3}{4}\times 10$	$7\times 24\frac{7}{8}$
9.	$\frac{7}{8}$ of 2	$\frac{5}{6}$ of 3	$\frac{3}{4}$ of 2	$\frac{2}{3}$ of 8	$\frac{4}{5}$ of 17

Find the answers to the following. Watch the signs.

10.	$3\frac{5}{8}$	$6\frac{1}{2}$	$8\frac{2}{3}$	$5\frac{4}{5}$	$7\frac{7}{8}$	$6\frac{5}{6}$
	$+6\frac{3}{4}$	$-3\frac{3}{4}$	$+7\frac{5}{6}$	$-3\frac{1}{2}$	$+9\frac{2}{3}$	$-4\frac{7}{8}$
11.	$4\frac{1}{2}$	$5\frac{2}{3}$	$3\frac{2}{9}$	$4\frac{9}{16}$	$8\frac{3}{4}$	$6\frac{7}{12}$
	$-\frac{5}{6}$	$+2\frac{5}{6}$	$-1\frac{1}{6}$	$+3\frac{5}{8}$	$-5\frac{5}{8}$	$+2\frac{2}{3}$

Measuring Volume

1. A cubic foot is 12 in. long, 12 in. wide, and 12 in. high. The volume of a cubic foot is how many cubic inches?



$12 \times 12 \times 12 = 1728$

You can see that a cubic foot contains 12 layers of inch cubes. Each layer contains 12×12 cu. in. So a cubic foot $= 12 \times 12 \times 12$ cu. in.

2. A cubic yard is 3 ft. long, 3 ft. wide, and 3 ft. high. A cubic yard equals how many cubic feet?

Think of a cubic yard as having 3 layers, each containing 9 cubic feet. A cubic yard $= 3 \times 3 \times 3$ cu. ft.

3. Find the volume of a box 4 ft. by 3 ft. by 2 ft.

4. How many cubic feet are there in the volume of a box 10 ft. long, 3 ft. wide, and 2 ft. deep?

5. How many cubic yards of space are there in a delivery truck 6 ft. long, 3 ft. wide, and 4 ft. high?

6. How many cubic feet of air space are there in a schoolroom 11 yards by 9 yards by 3 yards?

7. A swimming tank measures 80 ft. by 36 ft. by 6 ft. How many cubic feet of water will it hold?

8. A one-foot box (inside measurement) will hold how many half-foot blocks?

9. A cord of wood is 4 ft. wide, 4 ft. high, and 8 ft. long. How many cubic feet are there in a cord?

10. Find the volume of a brick 8 in. by 4 in. by 2 in.

Cubic Inches, Feet, and Yards

1728 cubic inches (cu. in.) = 1 cubic foot (cu. ft.)
27 cubic feet = 1 cubic yard (cu. yd.)
231 cubic inches = 1 gallon

Give the missing numbers.

1. 1 cu. ft. = ___ cu. in.

2. $\frac{1}{4}$ cu. ft. = ___ cu. in.

3. 1 cu. yd. = ___ cu. ft.

4. $\frac{1}{2}$ cu. yd. = ___ cu. ft.

5. 4 cu. ft. = ___ cu. in.

6. 5 cu. yd. = ___ cu. ft.

$\frac{1}{2}$ cu. ft. = ___ cu. in.

$\frac{3}{4}$ cu. ft. = ___ cu. in.

$\frac{1}{3}$ cu. yd. = ___ cu. ft.

$\frac{1}{4}$ cu. yd. = ___ cu. ft.

50 cu. ft. = ___ cu. in.

243 cu. ft. = ___ cu. yd.

Problems

Find the answer to each problem.

1. If an oil can measures 11 in. by 6 in. by 7 in., is it large enough to hold 2 gallons of oil?

2. If an oil can is 3 inches by 7 inches at one end, how many inches long must it be to hold 1 gallon?

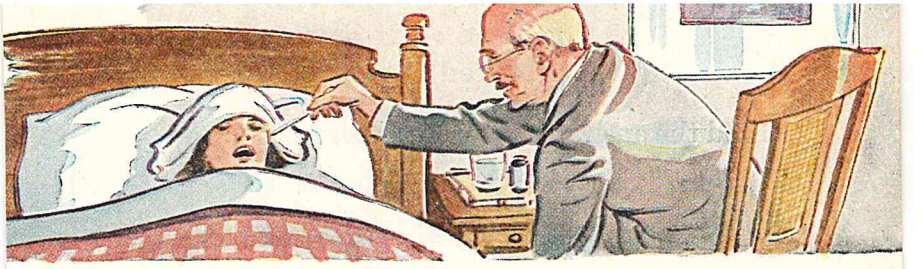
3. How many cubic feet are there in a room 9 ft. long, 8 ft. wide, and $9\frac{1}{2}$ ft. high?

4. How many cubic inches are there in a brick 8 in. long, 4 in. wide, and 2 in. thick?

5. Each pupil should have 200 cu. ft. of air space. How many pupils may occupy a room 35 ft. by 32 ft. by 10 ft.?

6. In digging a ditch 6 ft. wide, 3 ft. deep, and 150 ft. long, how many cubic yards of earth will be removed?

7. At 75¢ a cubic yard, what will it cost to dig a basement 14 yd. long, 9 yd. wide, and 3 yd. deep?



Arithmetic and the Human Body

Write A, S, M, or D for each step. Solve the problems.

1. The normal temperature of the body is about $98\frac{6}{10}°$. If a person suffering from sunstroke has a temperature of 106° (an extremely high temperature), how many degrees of fever does he have?

2. The pulse of a child of 11 years of age is about 85 beats per minute. What is the rate per second?

3. The pulse of a grown person beats about seventy-two times a minute. How many times does the pulse beat in twenty-four hours?

4. In quiet breathing about 1 pint of air is inhaled at each breath. During the deepest possible breathing the lungs can hold about 4 quarts of air. How many times as much air can the lungs hold as they take in during quiet breathing?

5. The weight of the blood is equal to about $\frac{1}{15}$ of the weight of the body. If an 11-year-old boy weighs 75 lb., what is the weight of his blood?

6. In a drop of blood the size of a pin's head there are about 5,000,000 red cells and about 7,000 white cells. About how many times as many red cells as white cells are there?

7. The heart moves about 5 ounces of blood at each stroke. At the rate of 72 beats per minute, how many pounds of blood are moved by the heart in 24 hr.?

Mixed Practice

Find the answers. Watch the signs.

1.	$\frac{7}{8}+\frac{7}{8}$	$\frac{3}{4}+\frac{7}{10}$	$\frac{1}{5}+\frac{3}{4}$	$\frac{1}{2}+\frac{9}{10}$	$\frac{5}{8}+\frac{13}{16}$
2.	$\frac{5}{16}+\frac{3}{4}$	$\frac{1}{8}+\frac{11}{12}$	$2\frac{7}{8}+3\frac{9}{16}$	$1\frac{1}{3}+4\frac{3}{4}$	$2\frac{2}{3}+1\frac{5}{6}$
3.	$5\frac{1}{4}+2\frac{7}{12}$	$\frac{5}{6}+\frac{3}{4}$	$2\frac{1}{2}+1\frac{5}{12}$	$\frac{5}{8}+\frac{11}{12}$	$2\frac{3}{8}+1\frac{11}{12}$
4.	$\frac{4}{6}+2\frac{2}{3}$	$\frac{3}{5}+\frac{9}{10}$	$6\frac{7}{8}+2\frac{3}{4}$	$3\frac{5}{9}+\frac{2}{3}$	$4\frac{7}{8}+\frac{2}{3}$
5.	$3\frac{2}{3}+1\frac{5}{8}$	$4\frac{2}{5}+3\frac{3}{4}$	$\frac{2}{3}+\frac{3}{8}$	$\frac{7}{10}+1\frac{3}{4}$	$3\frac{7}{12}+\frac{5}{6}$
6.	$\frac{1}{2}-\frac{1}{3}$	$2-\frac{7}{8}$	$4\frac{7}{8}-2\frac{7}{8}$	$3-1\frac{5}{6}$	$5\frac{8}{9}-1\frac{2}{9}$
7.	$4\frac{7}{8}-1\frac{3}{4}$	$7\frac{2}{3}-1\frac{3}{4}$	$5\frac{1}{4}-2\frac{5}{8}$	$6\frac{1}{6}-\frac{2}{3}$	$\frac{9}{10}-\frac{3}{4}$
8.	$3\frac{4}{5}-2\frac{1}{2}$	$\frac{3}{4}-\frac{3}{5}$	$2\frac{1}{3}-\frac{5}{9}$	$3\frac{5}{12}-1\frac{1}{4}$	$3\frac{1}{4}-1\frac{2}{3}$
9.	$8\frac{1}{3}-2\frac{7}{12}$	$4\frac{1}{2}-\frac{3}{5}$	$2\frac{1}{8}-1\frac{2}{3}$	$\frac{5}{6}-\frac{3}{4}$	$6\frac{1}{2}-3\frac{11}{12}$
10.	$7\frac{1}{5}-1\frac{3}{4}$	$5\frac{2}{3}-1\frac{7}{8}$	$\frac{1}{6}-\frac{1}{8}$	$2\frac{3}{16}-1\frac{5}{8}$	$5\frac{1}{12}-2\frac{5}{6}$

Multiply and check.

11.	468	795	846	760	937	609
	97	670	68	380	69	760
12.	596	379	487	876	890	614
	69	87	78	53	700	137
13.	487	385	875	368	627	806
	45	603	84	407	432	709

Divide and prove.

14.	$17\overline{)5985}$	$68\overline{)4659}$	$75\overline{)9068}$	$36\overline{)91141}$
15.	$99\overline{)8108}$	$73\overline{)7225}$	$44\overline{)3945}$	$45\overline{)63470}$
16.	$15\overline{)2592}$	$33\overline{)1648}$	$19\overline{)8587}$	$74\overline{)70000}$

Seventh Self-Test

Mixed Test

Find the answers.

1.

$\frac{5}{8}$	$\frac{5}{6}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{5}{6}$	638
$-\frac{1}{4}$	$-\frac{3}{4}$	$+\frac{5}{6}$	$+\frac{2}{3}$	$-\frac{5}{8}$	$\times$ 84

2.

85769	$\frac{7}{8}$	$\frac{4}{5}$	47	3636
-39086	$-\frac{5}{12}$	$-\frac{3}{4}$	691	4385
			960	8048
			7758	409

3.

99902	$\frac{3}{4}$	$\frac{5}{12}$	3904	87
-88355	$+\frac{1}{5}$	$+\frac{1}{4}$	6863	766

4.

968	$45\overline{)7973}$	95412	80492
$\times$ 75		-55928	-22788

5. $\frac{4}{5}+\frac{2}{3}$ $\quad$ $\frac{5}{6}-\frac{4}{9}$ $\quad$ $\frac{5}{8}+\frac{5}{6}$ $\quad$ $\frac{4}{5}-\frac{3}{4}$ $\quad$ $\frac{2}{3}+\frac{7}{8}$

6. $96\overline{)68597}$ $\quad$ $47\overline{)28627}$ $\quad$ $56\overline{)50854}$ $\quad$ $94\overline{)42302}$

Testing Your Thinking

1. How do you add 2 fractions with unlike denominators?

2. How do you change a fraction to its lowest terms?

3. How do you change an improper fraction to a whole or mixed number?

4. Which fraction is largest, $\frac{3}{4}$, $\frac{9}{12}$, or $\frac{15}{20}$?

5. How do you change $\frac{1}{6}$ and $\frac{1}{8}$ to 24ths?

6. Find the difference between $\frac{1}{2}$ and $\frac{1}{3}$.

7. How much is $2\frac{1}{2}$ times 100? $1\frac{1}{4}\times 20$?

8. What is the volume of a box 10 ft. by 3 ft. by 2 ft.?

Testing What You Have Learned

Find the answers.

1. Subtract the sum of \$5.75 and \$8.64 from \$20.

2. Multiply the sum of 65 and 87 by 67.

3. Add \$12.64 to the product of 28 and \$4.85.

4. Add 24, 85, 107, 3; then divide the sum by 2.

5. Subtract \$14.25 from \$16.48 and multiply the difference by 37.

6. Multiply 128 by 65; take one eighth of the product.

7. Subtract 245 from 25×46.

8. Divide 261 by 9; then multiply the quotient by 17.

9. Subtract \$450 from \$1740. Divide the remainder by 15.

10. Add $4\frac{3}{4}$ to the difference between 16 and $5\frac{1}{8}$.

11. Find the perimeter of a room 18 ft. by 14 ft.

12. Change $\frac{1}{2}$, $\frac{2}{3}$, $\frac{5}{6}$, $\frac{3}{4}$, and $\frac{3}{8}$ to twenty-fourths.

13. Change $\frac{5}{5}$, $\frac{6}{4}$, $\frac{9}{3}$, $\frac{7}{2}$, $\frac{12}{8}$, $\frac{16}{6}$, and $\frac{25}{10}$ to whole or mixed numbers.

14. What is the least common denominator of thirds, fourths, and eighths?

15. If 6 boys share the expenses of a picnic equally, what part of the expenses will each boy have to pay?

16. How do you change $\frac{2}{3}$ to twelfths?

17. Which fraction has the greater value, $\frac{7}{8}$ or $\frac{15}{16}$?

18. If Alfred spends $\frac{1}{5}$ of some money he earned, what part will he have left?

19. Find the lowest terms of $\frac{6}{8}$, $\frac{12}{15}$, $\frac{6}{9}$, $\frac{8}{10}$, and $\frac{9}{12}$.

Unit 29. Review of Fractions

Bills

1. In the following bill, find the cost of each item. Then find the total amount of the bill.

2. Find the total cost of $4\frac{1}{2}$ lb. butter @ 32¢; $3\frac{1}{4}$ lb. cheese @ 28¢; $3\frac{1}{2}$ doz. eggs @ 34¢; $2\frac{3}{4}$ lb. bacon @ 36¢; $3\frac{5}{8}$ lb. boiled ham @ 40¢.

Telephone: Green 1389

F. W. THOMAS

Groceries & Meats

518 Main Street
Manville, Tenn.

Sold to Mrs. H. L. Cole
Address 1614 N. Main St.

4 lb.	beans @ 6½¢			
2 lb.	cheese @ 28¢			
6 cans	corn @ 8 ⅓¢			
3 pt.	honey @ 30¢			
2 doz.	oranges @ 50¢			
3 qt.	milk @ 12¢			
4 cans	pears @ 17½¢			

3. Find the total cost of $1\frac{1}{2}$ doz. cups @ $1.10; $1\frac{1}{2}$ doz. saucers @ 90¢; $2\frac{1}{3}$ doz. dinner plates @ $2.40; $2\frac{1}{4}$ doz. soup dishes @ $2.80; $1\frac{1}{2}$ doz. tablespoons @ $3.

Find the products.

4.	$\frac{2}{3}\times 7$	$2\frac{1}{2}\times 5$	$\frac{3}{4}\times 19$	$5\times\frac{3}{4}$
5.	$12\frac{3}{4}\times 24$	$10\times 3\frac{1}{4}$	$9\times 15\frac{3}{5}$	$8\times 3\frac{3}{4}$
6.	$5\times 3\frac{3}{5}$	$9\times\frac{5}{6}$	$4\frac{3}{4}\times 30$	$\frac{3}{5}\times 15$
7.	$2\frac{2}{3}\times 21$	$\frac{3}{8}\times 10$	$13\times 3\frac{1}{8}$	$1\frac{2}{3}\times 14$
8.	$20\times 1\frac{7}{8}$	$5\times 1\frac{1}{3}$	$7\times\frac{3}{4}$	$3\frac{1}{2}\times 15$
9.	$\frac{5}{6}\times 40$	$\frac{2}{5}\times 11$	$\frac{2}{3}\times 12$	$\frac{3}{8}\times 20$
10.	$2\times 2\frac{1}{2}$	$3\times 3\frac{1}{3}$	$4\times 6\frac{1}{4}$	$3\times 2\frac{1}{4}$
11.	$2\times 3\frac{2}{5}$	$5\times 8\frac{1}{5}$	$6\times 2\frac{1}{6}$	$8\times 1\frac{3}{8}$

Multiplication of Fractions

Study the work in each example below. Then do the work with your book closed.

1. A pane of glass is 17 by $15\frac{3}{4}$ in. How many square inches does it contain?

Multiply 17 by $15\frac{3}{4}$.

Step 1. Multiply 17 by $\frac{3}{4}$. $3 \times 17 = 51$. $51 \div 4 = 12\frac{3}{4}$.

Step 2. Multiply 17 by 15, writing the partial products as shown.

Step 3. Add. There are $267\frac{3}{4}$ sq. in.

$$\begin{array}{r} 17 \\ 15\frac{3}{4} \\ \hline 4)\overline{51} \\ 12\frac{3}{4} \\ 85 \\ 17 \\ \hline 267\frac{3}{4} \end{array}$$

2. Multiply $31\frac{3}{8}$ by 19.

Step 1. Multiply $\frac{3}{8}$ by 19. $19 \times 3 = 57$. $57 \div 8 = 7\frac{1}{8}$.

Step 2. Multiply 31 by 19.

Step 3. Add. The product is $596\frac{1}{8}$.

$$\begin{array}{r} 31\frac{3}{8} \\ 19 \\ \hline 8)\overline{57} \\ 7\frac{1}{8} \\ 279 \\ 31 \\ \hline 596\frac{1}{8} \end{array}$$

Multiply the numbers below:

3.

15	17	20	18	21	27
$9\frac{1}{2}$	$8\frac{2}{3}$	$4\frac{5}{6}$	$5\frac{2}{5}$	$7\frac{3}{4}$	$8\frac{4}{9}$

4.

23	23	13	26	39	16
$8\frac{1}{4}$	$7\frac{3}{8}$	$6\frac{1}{3}$	$5\frac{1}{5}$	$6\frac{2}{3}$	$4\frac{5}{6}$

5.

17	48	35	45	30	36
$4\frac{7}{8}$	$6\frac{3}{4}$	$8\frac{4}{7}$	$9\frac{4}{5}$	$7\frac{5}{8}$	$5\frac{2}{3}$

6.

$46\frac{2}{3}$	$32\frac{3}{4}$	$26\frac{3}{8}$	$18\frac{5}{6}$	$31\frac{3}{5}$	$26\frac{1}{2}$
7	5	3	6	9	7

7. $32\frac{5}{8} \times 6$ $\quad$ $14\frac{5}{12} \times 5$ $\quad$ $12\frac{3}{16} \times 7$ $\quad$ $40\frac{3}{4} \times 9$

The Sewing Class

Write A, S, M, or D for each step. Solve the problems.

The 14 girls of Miss Williams' room are making some of their own clothes.

1. Each girl uses $\frac{5}{8}$ yd. of material to make an apron. How many yards do they all use?

2. Each girl uses $3\frac{7}{8}$ yd. of cotton material to make a dress. How many yards are needed for 14 dresses?

3. There are 42 yd. in a piece of goods. Each girl uses $\frac{3}{4}$ yd. to make sleeves. How many yards are left?

4. If $\frac{1}{8}$ of a yard is used in making one collar, how many yards are needed to make 6 collars?

5. How many handkerchiefs 12 inches square can be cut from one square yard of material?

6. How many square inches are there in a rectangular piece of cloth $9\frac{5}{8}$ in. wide and 16 in. long?

7. At $16\frac{2}{3}¢$ a yard, what is the value of a bolt of cloth containing 40 yards?

8. At \$1.50 a dozen, what is the cost of $2\frac{1}{2}$ dozen knitting needles?

Estimating Answers

Read the problem and write an answer that you think should be about right. Then solve the problem and compare the answer with your estimate.

1. A recipe calls for $\frac{1}{2}$ cup of flour. How much flour would you need if you made two times this recipe?

2. How many feet of fencing are needed for a garden which is 45 yd. long and 24 yd. wide?

3. Mrs. Brown bought $3\frac{1}{4}$ yards of dress goods on sale at 28¢ a yard. Find the cost.

4. How much does a man earn in $6\frac{1}{2}$ hours if he works for 70¢ an hour?

5. A farmer sold $7\frac{3}{4}$ bushels of potatoes at 48¢ a bushel. How much did he get for them?

6. The aerial, or receiving wire, for Arthur's radio is $67\frac{1}{2}$ feet long. He has decided to make it only $58\frac{1}{4}$ feet long. How much must he cut off?

7. At 28¢ per pound, what is the cost of $3\frac{3}{4}$ pounds of pork loin roast?

8. What is the combined length of two boards, one $16\frac{3}{4}$ feet long and the other $12\frac{1}{4}$ feet long?

9. A woman bought a chicken weighing $4\frac{3}{4}$ pounds at 28¢ a pound. What was her change from $10?

10. Edith lives $\frac{3}{8}$ of a mile from school. How far does she walk in 5 days, going to and from school?

11. At 35¢ a square foot, what will it cost to lay a cement walk $4\frac{1}{2}$ feet wide and 120 feet long?

12. At $62\frac{1}{2}$¢ an hour, how much will a man earn in a 40-hour week?

Practice in Addition of Fractions

1.	$1\frac{3}{5}$	$2\frac{7}{8}$	$3\frac{11}{16}$	$4\frac{2}{3}$	$3\frac{7}{10}$	$2\frac{4}{5}$	$1\frac{1}{2}$
	$\frac{7}{10}$	$5\frac{1}{12}$	$4\frac{5}{8}$	$6\frac{5}{9}$	$2\frac{1}{4}$	$3\frac{2}{3}$	$2\frac{2}{9}$
2.	$3\frac{1}{2}$	$4\frac{1}{3}$	$1\frac{3}{4}$	$1\frac{3}{8}$	$2\frac{1}{2}$	$1\frac{2}{3}$	$2\frac{7}{8}$
	$2\frac{3}{5}$	$2\frac{1}{2}$	$3\frac{1}{3}$	$4\frac{3}{4}$	$3\frac{2}{3}$	$5\frac{1}{6}$	$4\frac{1}{2}$
	$1\frac{3}{10}$	$1\frac{5}{6}$	$3\frac{1}{6}$	$2\frac{15}{16}$	$1\frac{7}{12}$	$2\frac{5}{9}$	$6\frac{3}{4}$
3.	$2\frac{1}{5}$	$1\frac{2}{3}$	$7\frac{3}{4}$	$8\frac{9}{10}$	$5\frac{3}{4}$	$9\frac{1}{2}$	$6\frac{1}{3}$
	$5\frac{1}{4}$	$4\frac{3}{8}$	$2\frac{5}{6}$	$6\frac{1}{4}$	$8\frac{2}{3}$	$6\frac{1}{6}$	$5\frac{1}{2}$
	$9\frac{1}{2}$	$7\frac{5}{6}$	$4\frac{2}{3}$	$3\frac{1}{2}$	$6\frac{2}{8}$	$3\frac{1}{9}$	$8\frac{1}{10}$

Sight Problems

1. Mr. Johnson spends $\frac{1}{4}$ of his salary for rent and $\frac{3}{8}$ of it for food and clothes. What part of his salary does he spend for these items?

2. If $\frac{3}{4}$ lb. of sugar is used in canning a quart of peaches, how many pounds are used in canning 24 qt.?

3. In making plum jam, 1 pound of sugar is used for 3 pints of plums. How many pounds of sugar are needed for 12 pints of plums?

4. If ham shrinks $\frac{1}{4}$ of its weight in roasting, how much will a 12-pound ham shrink?

5. A board $\frac{7}{8}$ inch thick was planed down $\frac{1}{4}$ inch. How thick is the board now?

6. At 40¢ per dozen, what do $3\frac{1}{2}$ dozen lemons cost?

7. Howard's brother earns $18 a week. How long will it take him to earn $72?

8. Three boxes weighed $1\frac{1}{2}$ lb., $3\frac{1}{4}$ lb., and 8 lb. What was the total weight?

Subtraction of Fractions

1.

$11\frac{1}{2}$	$4\frac{3}{4}$	$5\frac{1}{3}$	$2\frac{7}{8}$	$8\frac{1}{8}$	$3\frac{1}{5}$	20
$-\frac{1}{2}$	$-2\frac{1}{5}$	$-1\frac{5}{12}$	$-1\frac{1}{6}$	$-\frac{1}{2}$	$-1\frac{4}{5}$	$-15\frac{2}{3}$

2.

$2\frac{5}{6}$	$9\frac{1}{3}$	$6\frac{1}{9}$	$4\frac{1}{12}$	$6\frac{7}{16}$	$5\frac{1}{6}$	$9\frac{5}{16}$
$-1\frac{2}{3}$	$-4\frac{7}{8}$	$-2\frac{2}{3}$	$-2\frac{5}{8}$	$-3\frac{1}{8}$	$-2\frac{1}{2}$	$-4\frac{1}{4}$

Problem Practice

1. What is the average speed of a boat that covers 110 miles in 4 hours?

2. At 35 miles an hour, how far can I drive my car in $5\frac{1}{2}$ hours?

3. How many hours will it take a train to run 399 miles if it travels at the rate of 42 miles an hour?

4. The boy scouts took a 6-day hike and walked 14 mi., 9 mi., 7 mi., 15 mi., 7 mi., and 12 mi. What was the average number of miles they hiked a day?

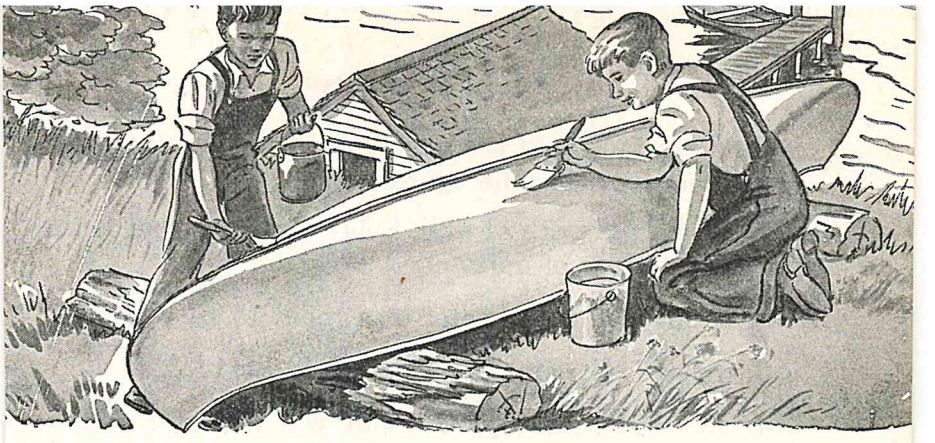
5. A man drove his car $3\frac{1}{2}$ hours in the morning and $2\frac{1}{4}$ hours in the afternoon at an average speed of 28 miles an hour. How many miles did he drive?

6. At an average speed of $36\frac{1}{2}$ miles an hour, what distance will a train travel in 24 hours?

7. An airplane flew a distance of 3354 miles in 26 hours. What was the average speed?

8. Mr. Brown is taking an auto trip of 724 miles. After driving $7\frac{1}{2}$ hours at the rate of 48 miles an hour, how far has he still to go?

9. At what speed must an airplane fly to travel 960 miles in 6 hours?



Unit 30. Problems with Fractions

Preparing for a Canoe Trip

Alfred and Harold are making plans for a 6-day canoe trip to Manville, a small village 35 miles from home.

1. They are allowing 75¢ a person per day for food. What will be each boy's share for food for the 6-day trip?

2. Alfred wants a shirt for $1.25, a knife for 75¢, and fishing tackle for 85¢. How much will these cost?

3. They hope to reach Manville in 3 days. How many miles, on the average, must they cover each day?

4. The first night they plan to camp near a small village $12\frac{3}{8}$ mi. up the stream. When they have reached this point, how many miles will they still have to go?

5. Beyond this village there is a shallow spot in the river for $\frac{1}{8}$ mile, where they will have to carry their canoe. For how many feet will they have to carry it?

6. The canoe weighs 43 lb. The boys do not want the canoe and luggage to weigh more than 60 lb. How many pounds of luggage may each boy take along?

Sight Problems

Find the facts and the question, then solve the problem without writing the figures.

1. When the price of milk is 11¢ a quart, what is the cost of 20 quarts of milk?

2. What is the perimeter of a room 15 ft. by 12 ft.?

3. What is the area of a floor 10 ft. by 14 ft.?

4. At $3 a square yard, what will it cost to put a cement floor in a basement 8 yd. wide and 10 yd. long?

5. When candy sells at 60¢ a pound, what will 1 pound and 8 ounces of candy cost?

6. At an average speed of 150 miles per hour, how many hours will it take an airplane to fly 600 miles?

7. If you can buy 6 cans of peaches for $1.32, what is the price per can?

8. An orchard contains 180 trees planted in 9 equal rows. How many trees are there in each row?

9. If you are paid 40¢ an hour, how much can you earn in 10 days of 8 hours each?

10. If an auto travels at a speed of 40 miles an hour, how long will it take to travel 60 miles?

11. How many pint bottles of milk can be filled from 8 gallons of milk?

12. When $\frac{1}{2}$ dozen cans of peaches sell for $1, what will 3 dozen cans of peaches cost?

13. Lucy ordered $\frac{3}{4}$ of a pound of ham. The clerk cut off a piece weighing $\frac{7}{8}$ lb. How much too heavy was this?

14. Change 1 yd. 2 ft. and 9 in. to inches.

Measures

Write the missing numbers.

1.	1 yd. = ___ ft.	1 ft. = ___ in.	1 min. = ___ sec.
2.	1 yd. = ___ in.	1 rd. = ___ ft.	1 hr. = ___ min.
3.	1 qt. = ___ pt.	1 gal. = ___ pt.	1 da. = ___ hr.
4.	1 gal. = ___ qt.	1 pk. = ___ qt.	1 wk. = ___ da.
5.	1 bu. = ___ pk.	1 score = ___	1 yr. = ___ mo.
6.	1 lb. = ___ oz.	1 ton = ___ lb.	1 dozen = ___
7.	1 mi. = ___ rd.	1 pt. = ___ cups	1 qt. = ___ cups

Find the missing fractions. Example: 1 qt. = $\frac{1}{4}$ gal.

8.	1 qt. = ___ gal.	2 qt. = ___ gal.	1 pk. = ___ bu.
9.	6 qt. = ___ pk.	2 pk. = ___ bu.	4 qt. = ___ pk.
10.	1 = ___ doz.	2 = ___ doz.	3 = ___ doz.

Problem Practice

1. How many square yards are there in the area of a floor 27 feet long and 18 feet wide?

2. What is the perimeter of a room 16 feet long and 12 feet wide?

3. When soft coal sells at $6.75 a ton, what is the cost of 42 tons of this coal?

4. A board 20 feet long was cut into 6 equal pieces. How many feet and inches long was each piece?

5. A farmer fed 40 T. of hay to 24 cows. How many tons did he average per cow? Reduce answer to simplest form.

6. Find the cost of $\frac{1}{2}$ lb. of chocolates at 60¢ a pound and 2 lb. of caramels at 40¢ a pound.

Sight Problems

Solve each problem without writing the figures.

1. How many acres are there in a field 20 rods long and 8 rods wide?

2. At 32¢ a pound, what do 10 ounces of cheese cost?

3. When velvet sells for $3.20 per yard, what is the cost of $1\frac{3}{4}$ yards?

4. Using $1\frac{1}{2}$ bushels an acre, how many bushels of seed does a farmer need to sow 6 acres?

5. At 2 for 25¢, what is the cost of 8 cans of corn?

6. At 15¢ an hour, how long will it take to earn 90¢?

7. At 3 for 10¢, what is the cost of 2 dozen oranges?

8. If a train runs 200 miles in 5 hours, what is the average speed?

9. At $3 a dozen, what is the cost of $1\frac{1}{2}$ dozen knives?

10. A box of candy weighs 8 ounces. What is the weight in pounds of 16 boxes?

11. At $12\frac{1}{2}$¢ per can, what is the cost of a dozen cans of corn?

12. At $16\frac{2}{3}$¢ per can, what do 6 cans of pears cost?

13. At $33\frac{1}{3}$¢ per pound, what do 6 lb. of coffee cost?

14. If a man walked 14 miles in 4 hours, what was his average speed?

15. Bob sold onions at 3 bunches for 7¢. How much did he get for 3 dozen bunches of onions?

16. Walter sold $4\frac{1}{2}$ dozen eggs. At 40¢ a dozen, how much did he get for the eggs?

Problem Practice

For each step write A, S, M, or D. Solve the problems.

1. Arthur earns 20¢ an hour running errands. On Monday he worked $2\frac{1}{2}$ hr., on Tuesday $3\frac{3}{4}$ hr., and on Wednesday $5\frac{1}{2}$ hr. How much did he earn in the 3 days?

2. At $3.40 per square yard, how much will it cost to lay a cement floor 12 yd. by 6 yd.?

3. A dealer paid $7209 for 9 automobiles. He sold them at $945 each. What was his profit?

4. A dealer sold 76 acres of land for $7980. What was the selling price per acre?

5. Ed's father had $128.42 in the bank. He deposited $225 and drew out $198.45. What was his balance then?

Measures

Find the missing fractions. Example: $4 = \frac{1}{3}$ doz.

1.	4 = ___ doz.	5 = ___ doz.	6 = ___ doz.
2.	7 = ___ doz.	8 = ___ doz.	9 = ___ doz.
3.	10 = ___ doz.	11 = ___ doz.	12 = ___ doz.
4.	1 oz. = ___ lb.	2 oz. = ___ lb.	3 oz. = ___ lb.
5.	4 oz. = ___ lb.	5 oz. = ___ lb.	6 oz. = ___ lb.
6.	7 oz. = ___ lb.	8 oz. = ___ lb.	9 oz. = ___ lb.
7.	10 oz. = ___ lb.	11 oz. = ___ lb.	12 oz. = ___ lb.
8.	13 oz. = ___ lb.	14 oz. = ___ lb.	15 oz. = ___ lb.
9.	1 in. = ___ ft.	2 in. = ___ ft.	3 in. = ___ ft.
10.	4 in. = ___ ft.	6 in. = ___ ft.	8 in. = ___ ft.
11.	10 in. = ___ ft.	5 in. = ___ ft.	7 in. = ___ ft.
12.	12 in. = ___ yd.	6 in. = ___ yd.	9 in. = ___ yd.

Mixed Practice

Find the answers. Watch the signs.

1.	$\frac{5}{6}+\frac{1}{4}$	$\frac{4}{5}+\frac{3}{4}$	$\frac{1}{2}+\frac{3}{8}$	$\frac{9}{10}+\frac{2}{5}$	$\frac{7}{8}+\frac{5}{12}$
2.	$\frac{5}{6}-\frac{1}{4}$	$\frac{4}{5}-\frac{3}{4}$	$\frac{1}{2}-\frac{3}{8}$	$\frac{9}{10}-\frac{2}{5}$	$\frac{7}{8}-\frac{5}{12}$
3.	$\frac{5}{6}\times 8$	$\frac{4}{5}\times 9$	$15\times\frac{3}{8}$	$\frac{9}{10}\times 6$	$4\times\frac{5}{12}$

Sight Problems

Write only the answers.

1. At 50¢ a square yard, what is the cost of linoleum for a floor 4 yd. long and 3 yd. wide?

2. How many acres are there in a wood lot 80 rods long and 20 rods wide?

3. At 3 cans for 29¢, what is the price of 1 can of corn?

4. At 12¢ per pound, what is the cost of a small ham weighing $6\frac{1}{2}$ pounds?

5. If a man saves $20 each month, how much will he save in two years?

6. At 3 bars for 25¢, how many bars of soap can you get for $1?

7. At 2 cans for 35¢, what will 6 cans of pears cost?

8. How many acres are there in a strip of land 20 rods long and 8 rods wide?

9. Louis makes $1\frac{1}{2}$¢ on each paper he sells. How much does he make on 50 papers?

10. A room is 18 feet by 20 feet. How many square yards are there in the area of the floor?

11. Jim spends 10¢ for carfare and 25¢ for lunch each day. How much does he spend in 5 days?

Unit 31. Practice in Measures and Problems

Uses for Measures

1. Name 8 articles that are sold by weight.

2. Name 4 heavy articles sold by the ton.

3. Name 8 articles that are sold by liquid measure.

4. Name 5 things that are sold by dry measure.

5. Name 4 articles that are sold by length.

6. Name occupations in which workers are paid by the hour, the day, the week, the month, or the year.

7. Name 4 articles sold by the pair, 4 sold by the piece, and 4 sold by the dozen.

8. Name 6 different coins used in the United States.

9. Name 3 things that are sold by square measure.

10. How are eggs, apples, nails, screws, cloth, and bread sold? (Ex.: Soap is sold by the cake or bar.)

11. How many feet of fencing will be needed to go around a lot 120 feet long and 50 feet wide?

12. If an auto weighs 3475 pounds, how many pounds more than a ton does it weigh?

13. Lucy weighs $57\frac{1}{4}$ lb., Martha weighs $58\frac{3}{4}$ lb., and Edith weighs 67 lb. Find their average weight.

14. Find the number of inches in 1 mile.

15. If Jim's mother buys $\frac{1}{2}$ doz. cans of peaches and $\frac{2}{3}$ doz. cans of pears, how many cans will she have bought?

16. How many ounces are there in $1\frac{3}{4}$ pounds?

17. Which is longer, $\frac{3}{4}$ yd. or $\frac{2}{3}$ yd.? how much longer?

Problem Practice

For each step write A, S, M, or D. Solve the problems.

1. When 3 cans of soup sell for 22¢, what will 12 cans of soup cost?

2. How many glasses of milk can be served from 6 quarts of milk, if each glass holds $\frac{1}{2}$ pint?

3. If a cow gives an average of $1\frac{1}{2}$ gallons of milk twice a day, how many quarts does she give in a week?

4. At 32¢ a yard, what is the cost of linen for 9 towels if $\frac{7}{8}$ yd. is used for each towel?

5. What is the cost of $\frac{3}{4}$ yd. of ribbon at 36¢ a yard and $1\frac{1}{3}$ yd. of lace at $1.20 a yard?

6. Ed walks $\frac{3}{4}$ mi. each way to school every day. How far will he walk in a school year of 180 days?

Measures

Give the missing numbers.

1. 6 ft. 5 in. = ___ in.	19 in. = ___ ft. ___ in.
2. 2 yd. 2 ft. = ___ ft.	7 ft. = ___ yd. ___ ft.
3. 6 yd. 1 ft. = ___ ft.	20 ft. = ___ yd. ___ ft.
4. 3 qt. 1 pt. = ___ pt.	13 pt. = ___ qt. ___ pt.
5. 3 gal. 3 qt. = ___ qt.	17 qt. = ___ gal. ___ qt.
6. 4 lb. 12 oz. = ___ oz.	42 oz. = ___ lb. ___ oz.
7. 3 min. 15 sec. = ___ sec.	81 sec. = ___ min. ___ sec.
8. 5 hr. 25 min. = ___ min.	45 mo. = ___ yr. ___ mo.
9. 2 da. 9 hr. = ___ hr.	37 hr. = ___ da. ___ hr.
10. 4 wk. 3 da. = ___ da.	32 da. = ___ wk. ___ da.

Measures

Give each answer as a mixed number.

1. 2 gal. 3 qt. $= 2\frac{3}{4}$ gal.
2. 1 da. 12 hr. $=$ __ da.
3. 3 wk. 4 da. $=$ __ wk.
4. 2 yr. 8 mo. $=$ __ yr.
5. 3 yr. 3 mo. $=$ __ yr.
6. 3 ft. 2 in. $=$ __ ft.
7. 3 yd. 2 ft. $=$ __ yd.
8. 3 lb. 12 oz. $=$ __ lb.
9. 18 mo. $=$ __ yr.

2 ft. 6 in. $=$ __ ft.

2 hr. 40 min. $=$ __ hr.

3 yr. 9 mo. $=$ __ yr.

1 yr. 4 mo. $=$ __ yr.

5 yr. 6 mo. $=$ __ yr.

2 ft. 10 in. $=$ __ ft.

2 lb. 4 oz. $=$ __ lb.

4 lb. 6 oz. $=$ __ lb.

20 sq. ft. $=$ __ sq. yd.

Problems

Write A, S, M, or D for each step. Solve the problems.

1. A grocer pays \$2.75 for a box of 120 lemons and sells them at 35¢ a dozen. What does he make on the box?

2. If I buy $6\frac{3}{4}$ lb. of beef at 28¢ per pound, what is my change from \$2?

3. At \$6.50 per day, how much can a man earn in $16\frac{1}{2}$ days?

4. Mr. Adams raised prize corn to exhibit at the county fair. His yield per acre for 3 years was: 94 bu., 104 bu., and 96 bu. What was his average yield?

5. A certain boat can run at a speed of 10 mi. per hour. How far can it run in $1\frac{3}{4}$ hours?

6. A basket of tomatoes weighs 19 lb. The empty basket weighs $1\frac{1}{2}$ lb. Find the weight of the tomatoes.

Estimating Answers

Find the facts given and the question asked.
Decide the correct way to work the problem.
Select the answer that you think nearest correct.
Solve the problem and compare the answer with your estimate.

1. Louis makes a profit of 7¢ on each magazine he sells. How much will he make on 35 magazines?

Will Louis make about $2.50 or about $5.00 profit?

2. If a bus averages 35 miles per hour, how far will it travel from 8 A.M. till noon?

Will the bus travel about 150 miles or about 200 miles?

3. Howard and his two friends each paid 60¢ for a circus ticket and 10¢ for candy. How much did they spend?

Did they spend about 75 cents or about a dollar?

4. How many ounces are there in a pound and a quarter?

Are there about 18 ounces or about 24 ounces?

5. Edith has $5. How much more does she need to buy a $3.50 hat and 2 pairs of stockings at 75¢ a pair?

Does she need 1 cent more or a dollar more?

6. A grocer bought 5 bushels of potatoes for $3. He sold them for $1 a bushel. How much did he make?

Did he make about $3 or about $5?

7. If you buy 3 radio tubes at 60¢ each, what is your change from $5?

Would your change be about $.80 or about $3?

Mixed Practice

Find the answers. Watch the signs.

1. $635+9786+82+954+12547+954+8693$

2.	$7830-975$	$8641-1783$	$40721-8063$
3.	$4876-78$	6740×680	87640×407
4.	$8631\div56$	$28270\div76$	$18155\div89$
5.	$18732\div8$	$6943\div48$	$76391-809$
6.	9800×720	$41575\div77$	7600×860

7. Find the difference between 90047 and 3674.

8. What is the sum of 548, 9764, 76, and 8005?

9. What is the product of 648 and 74?

10. If you divide 942 by 16, what is the quotient?

11. The minuend is 7543, and the subtrahend is 984. Find the remainder and prove your answer.

12. When the multiplier is 76 and the multiplicand is 5600, what is the product?

13. Find the quotient in four thousand two hundred twenty-five divided by sixty-five.

14. What is the sum of two thirds and three fourths?

15. Subtract one and one half from two and one third.

16. What is the l.c.d. of halves, fourths, and thirds?

17. From twenty subtract four and one half.

18. Multiply 15 by 3 and add 6 to the product.

19. Add 8×4 to the sum of $8+4$.

20. If the dividend is 10 and the divisor is 4, what is the quotient?

Sight Problems

Solve each problem without writing the figures.

1. Jerry is $54\frac{3}{4}$ inches tall, and Walter is $52\frac{1}{2}$ inches tall. Jerry is how much taller than Walter?

2. At 24¢ a pound, what do $2\frac{3}{4}$ pounds of bacon cost?

3. A \$4 hat was reduced by $\frac{1}{8}$ of the regular price. What was the sale price?

4. If $\frac{2}{5}$ of the population are voters, how many voters are there in a city of 4500 inhabitants?

5. At 30¢ a quart, what do 2 gal. of ice cream cost?

6. Jim weighs $64\frac{3}{4}$ pounds, which is $3\frac{3}{4}$ pounds underweight. How much should he weigh?

7. At 44¢ a pound, what do $3\frac{1}{2}$ pounds of steak cost?

8. At 19¢ a peck, what will two bushels of potatoes cost?

9. What is the total weight of 3 packages that weigh $1\frac{1}{4}$ pounds, $1\frac{3}{4}$ pounds, and $1\frac{1}{2}$ pounds?

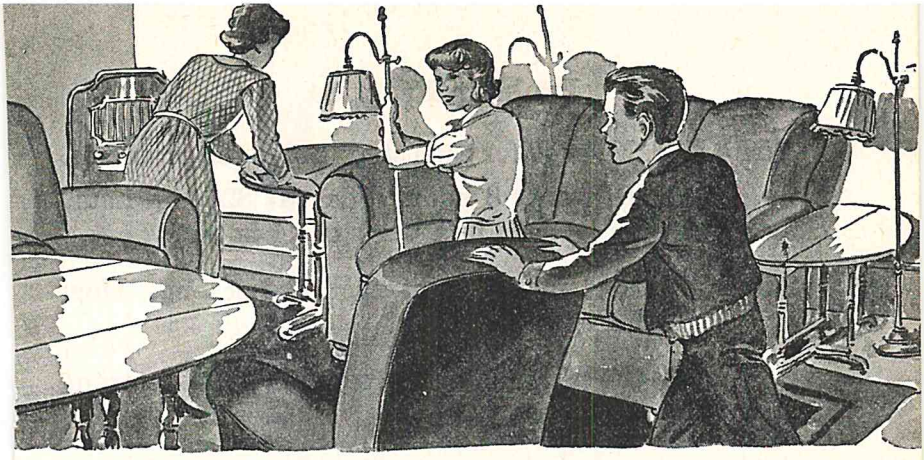
10. At \$3 per square yard, what will it cost to lay a cement walk 6 yards long and $1\frac{1}{2}$ yards wide?

11. At 60¢ an hour, how much will a man earn if he works $5\frac{3}{4}$ hours?

12. A box of fruit weighs $8\frac{1}{2}$ lb. The empty box weighs $\frac{7}{8}$ lb. What is the weight of the fruit?

13. If ice sells at 100 lb. for 40¢, what should 25 lb. of ice cost at the same rate?

14. From a piece of dress goods measuring $18\frac{1}{2}$ yd., a piece $3\frac{3}{4}$ yd. long and another $2\frac{1}{4}$ yd. long were cut off. How much was left in the piece?



Unit 32. Problems and Practice

Bills

Mr. and Mrs. King have recently bought new furniture for their home.

Make out separate bills for the following lists. Get the prices from catalogues or use the prices charged in your own neighborhood. Find the total of each bill.

1. *Living Room:* 1 rug. 2 floor lamps. 1 couch. 2 large chairs. 2 tables. 1 radio. 1 table. 4 pr. curtains.

2. *Dining Room:* 1 table. 6 chairs. 1 buffet. 2 pr. curtains. 1 rug. 2 tablecloths. 2 doz. napkins.

3. *Bedroom:* 1 dresser. 2 beds. 2 chairs. 1 rug. 1 lamp. 1 pr. curtains.

4. *Bedroom:* 1 bed. 1 dresser. 1 chair. 1 table. 1 pr. curtains.

5. *Kitchen:* 1 gas stove. 1 refrigerator. 1 chair. 1 table. 1 cabinet. 1 set of dishes. 2 pr. curtains.

6. *Bathroom:* 1 laundry container. 6 bath towels. 4 hand towels. 4 washcloths. 2 pr. curtains.

Problem Practice

Write A, S, M, or D for each step. Solve the problems.

1. Mr. Smith works 8 hours a day at $82\frac{1}{2}¢$ an hour. How much does he earn in a week of 44 hours?

2. I bought 6 strips of carpet, each $7\frac{1}{2}$ feet long. How many yards of carpet did I buy?

3. What is the cost of laying 42 square yards of cement floor at $37\frac{1}{2}¢$ per square foot?

4. A boy drank 3 glasses of milk a day. If each glass holds half a pint, how many quarts of milk did he drink in 28 days?

5. Mrs. Davis bought 56 yards of muslin. She used $\frac{1}{2}$ of it in making sheets and $\frac{1}{4}$ of it in making pillow cases. How many yards of muslin did she have left?

6. During his stay in Chicago Mr. Bond paid \$2.50 a day for hotel room and \$1.85 a day for his meals. What did his room and meals cost for 2 weeks?

7. What is the cost of $3\frac{1}{2}$ dozen eggs at $28¢$ per dozen and $4\frac{3}{4}$ pounds of ham at $40¢$ per pound?

8. One blackboard is 9 feet long and $3\frac{1}{2}$ feet wide, and another is 11 feet by 3 feet. The second blackboard is how much larger than the first?

9. In a schoolroom there are 6 windows, each 3 feet wide and $8\frac{1}{4}$ feet high. How many square feet are there in the area of these windows?

10. From a board $11\frac{1}{4}$ feet long, Ed cut off a piece $5\frac{3}{4}$ feet long. How long was the remaining piece?

11. If a machine takes 1 minute to cut a steel bar into 2 parts, how long will it take to cut it into 4 parts?

Sight Problems

1. At the rate of 50¢ for 3 cans of corn, what is the price per can?

2. At $5\frac{1}{2}$¢ per pound, what do 20 pounds of sugar cost?

3. At 3 cans for a quarter, what is the cost of 9 cans of tomato juice?

4. At $19\frac{1}{2}$¢ per gallon, what is the cost of 10 gallons of gasoline?

5. At 16¢ a gallon, what is the cost of $10\frac{1}{2}$ gallons of gasoline?

6. When motor oil sells for 60¢ per gallon, what is the price per quart?

7. At $12\frac{1}{2}$¢ per can, what do 4 cans of corn cost?

8. At 30¢ per yard, what do $2\frac{1}{2}$ yd. of ribbon cost?

Mixed Practice

1.	856283	251436	576	59	37
	−497675	−122839	×87	85	24
				56	89
2.	980109	118162	984	7	28
	−263042	−33839	×87	83	60

3.	$65\overline{)6294}$	817463	84	70	71	93
		−292829	87	62	93	77
			50	36	52	24
4.	479×64	375094	96	85	64	52
		−294647	45	46	25	17

5.	$37\overline{)27787}$	$27\overline{)14074}$	$59\overline{)30210}$	$45\overline{)46008}$
6.	$78\overline{)41006}$	$66\overline{)52787}$	$96\overline{)90018}$	$76\overline{)14366}$

Sight Work

Give the missing numbers.

1. 1 yd. 1 ft. = ___ ft.	1 ft. 5 in. = ___ in.
2. 1 lb. 3 oz. = ___ oz.	1 rd. $2\frac{1}{2}$ ft. = ___ ft.
3. 2 qt. 1 pt. = ___ pt.	3 gal. 2 qt. = ___ qt.
4. 40 in. = ___ ft. ___ in.	40 in. = ___ ft.
5. 2 da. 2 hr. = ___ hr.	3 wk. 1 da. = ___ da.
6. 4 ft. = ___ yd. ___ ft.	4 ft. = ___ yd.
7. 20 oz. = ___ lb. ___ oz.	20 oz. = ___ lb.
8. 13 qt. = ___ gal. ___ qt.	13 qt. = ___ gal.
9. 2 min. 12 sec. = ___ sec.	1 hr. 10 min. = ___ min.

Problems

1. Jim weighed 59 lb. in May and $64\frac{3}{4}$ lb. in August. How many pounds did he gain?

2. Susan bought $2\frac{3}{4}$ yd. of blue ribbon and $3\frac{1}{4}$ yd. of white ribbon. At 20¢ a yard, what was the cost?

3. At $6\frac{1}{4}$¢ per bar, what will 4 bars of soap cost?

4. At $1.50 an hour, how much will a man earn in $7\frac{1}{2}$ hr.?

5. The cash fare on the streetcar is 7¢, but you can buy 4 tickets for 25¢. How much can you save on 4 rides by buying tickets?

6. Mabel needs $\frac{3}{4}$ yd. for one towel. How many yards will she need for 4 towels?

7. At $1\frac{4}{5}$¢ per mile, what will the railroad fare cost for a trip of 15 miles?

8. How many cubic inches are there in a box 12 in. long, 5 in. wide, and $4\frac{1}{2}$ in. deep?

Sight Problems

Write the answer for each problem.

1. At 6¢ per pint, what will 3 quarts of milk cost?

2. Arthur lives $\frac{1}{4}$ mile from school. What part of a mile does he walk in going to and from school?

3. How many tiles 6 inches square will it take to cover a square foot?

4. At 25¢ per peck, what do 2 bu. of potatoes cost?

5. How many quart jars will be needed to hold $2\frac{1}{2}$ gallons of canned fruit?

6. At the rate of $8 per ton, what do $7\frac{1}{4}$ T. of coal cost?

7. At 30¢ a dozen, what will 30 eggs cost?

8. How many inches are there in $4\frac{1}{4}$ feet?

9. A farmer gets 6 gallons of milk daily. He sells 20 quarts of milk to his neighbors. How many quarts of milk has he left?

10. At $200 an acre, how much would $2\frac{1}{4}$ acres of land cost?

11. How many feet of fencing will it take to go around a lot 250 feet long and 100 feet wide?

12. Bob walks $\frac{7}{8}$ of a mile to school. How far does he walk in going to and from school?

13. How many $\frac{1}{2}$-pint bottles will it take to hold a gallon of cream?

14. Allowing 8 dishes to a quart, how many quarts of ice cream will you need for 32 dishes?

15. A box filled with potatoes weighed $56\frac{3}{4}$ lb. The empty box weighed $2\frac{1}{8}$ lb. What did the potatoes weigh?

Problem Practice

1. How many feet of fencing will it take to fence a yard $64\frac{3}{4}$ ft. long and $42\frac{1}{2}$ ft. wide?

2. Henry ran the hundred-yard dash in $11\frac{4}{5}$ seconds. The day before he ran it in $12\frac{1}{5}$ seconds. By how much had he improved his record?

3. A dealer bought 42 tons of coal. How much coal does he have left after selling $8\frac{3}{4}$ tons to one family and $11\frac{3}{8}$ tons to another?

4. Before he started on a trip, Mr. Brown's automobile had gone 3632 miles. On his return 9 days later it had gone 4748 miles. What was the average distance per day the automobile had been driven during the 9 days?

5. In the running broad jump Arthur jumped $10\frac{1}{4}$ ft. Henry jumped $8\frac{1}{3}$ ft. How many feet farther did Arthur jump?

6. How many acres are there in a field 70 rods long and 40 rods wide?

7. At \$3 per square yard, what will it cost to lay a cement walk 120 feet long and 4 feet wide?

8. An automobile averages 16 miles to a gallon of gasoline. At 18¢ per gallon, what will the gasoline cost for a trip of 392 miles?

9. At $6\frac{1}{4}$¢ a can, what do 3 dozen cans of soup cost?

10. A load of potatoes weighed 4870 pounds. The empty truck weighed 2150 pounds. How many bushels of potatoes were there in this load? (60 lb. = 1 bu.)

11. Two boys made 3 gallons of lemonade to sell. They bought 48 lemons at 36¢ a dozen and 6 pounds of sugar at 6¢ per pound. They sold the lemonade in half-pint glasses at 5¢ each. What was each boy's profit?

Eighth Self-Test

Mixed Test

Add the columns below:

1.

$78.35	$49.68	$77.51	$56.34	$84.58
49.67	56.34	5.87	75.87	58.79
61.52	7.94	68.99	7.59	47.08
77.80	68.50	9.32	82.48	6.67
55.39	9.99	78.46	68.32	40.15
98.64	78.43	11.63	1.82	37.79

Find the answers. Watch the signs.

2.

$971.92	$300.21	$702.53	$466.57
−302.99	−276.23	−208.84	−270.65

3.

$929.96	$776.39	$982.11	$818.64
−135.17	−406.86	−449.78	−563.26

4.

4765	6029	4853	761	697	308
×149	×206	×276	×627	×357	×78

5.

9627	2138	5401	457	769	896
×385	×34	×538	×469	×98	×654

6.

$2\frac{3}{4}$	$5\frac{1}{5}$	$6\frac{3}{8}$	$8\frac{7}{12}$	$3\frac{4}{9}$	$7\frac{1}{4}$
$+6\frac{7}{8}$	$-3\frac{1}{2}$	$+4\frac{5}{6}$	$-5\frac{2}{3}$	$+2\frac{2}{3}$	$-3\frac{3}{5}$

7.

$4\frac{3}{16}$	$6\frac{5}{12}$	$9\frac{1}{6}$	$4\frac{3}{4}$	$5\frac{1}{2}$	$7\frac{5}{6}$
$-2\frac{1}{2}$	$+5\frac{3}{4}$	$-2\frac{2}{3}$	$+3\frac{5}{16}$	$-2\frac{7}{8}$	$+8\frac{5}{12}$

8. $26\overline{)14616}$ $68\overline{)20204}$ $93\overline{)60448}$ $64\overline{)13443}$

9. $88\overline{)21655}$ $63\overline{)20070}$ $74\overline{)59274}$ $68\overline{)57120}$

Problem Test

Write the answer to each problem.

1. What is the area of a floor 12 ft. by $9\frac{1}{2}$ ft.?

2. Mildred practiced her music lesson $1\frac{1}{4}$ hours on Monday, $\frac{1}{2}$ hour on Tuesday, and $\frac{3}{4}$ hour on Wednesday. How long did she practice in the 3 days?

3. Find the cost of $4\frac{1}{2}$ yards of ribbon at 30¢ per yard and 3 spools of thread at 5¢ each.

4. At 15 cents each, how many handkerchiefs can I buy for 75 cents?

5. Henry had $5. He spent 85¢ for a knife and $1.75 for a ball and bat. How much money did he have then?

6. Martha's mother bought $\frac{3}{4}$ yd. of lace at 60¢ a yard. What change should she get from $1?

7. A pail filled with lard weighs 25 pounds. The pail alone weighs $1\frac{1}{4}$ pounds. What does the lard weigh?

8. Harold earns $3 a week. How many weeks will it take him to earn $51?

9. When 3 bars of soap cost 25¢, what will 12 bars cost?

10. One Saturday Louis worked $2\frac{3}{4}$ hours in the morning and $3\frac{1}{2}$ hours in the afternoon. How many hours did he work in all?

11. At a speed of 120 miles per hour, how far will an airplane travel in $\frac{3}{4}$ of an hour?

12. At an average speed of $2\frac{1}{2}$ miles per hour, how far will a man walk in 8 hours?

13. At 40¢ a dozen, what will 36 oranges cost?

14. When apples sell at 6 lb. for 25¢, how many pounds of apples can you buy for $1?

Test in Measures

Give the missing numbers.

1. $\frac{3}{4}$ yd. = ___ in.
2. 24 oz. = ___ lb.
3. $\frac{3}{8}$ gal. = ___ pt.
4. $2\frac{1}{2}$ tons = ___ lb.
5. $\frac{2}{3}$ ft. = ___ in.
6. 8 oz. = ___ lb.
7. $1\frac{1}{4}$ hr. = ___ min.
8. 4 in. = ___ ft.
9. $2\frac{1}{3}$ dozen = ___
10. 3 qt. = ___ pk.
11. $5\frac{1}{2}$ qt. = ___ pt.
12. 18 in. = ___ yd.
13. $\frac{2}{3}$ yd. = ___ in.
14. 12 oz. = ___ lb.
15. $\frac{5}{6}$ ft. = ___ in.
16. 15 min. = ___ hr.
17. $\frac{7}{8}$ lb. = ___ oz.
18. $\frac{3}{5}$ min. = ___ sec.
19. 1 mile = ___ rd.
20. 3 wk. = ___ da.
21. $\frac{5}{8}$ pk. = ___ qt.
22. 1 rd. = ___ yd.
23. $1\frac{1}{3}$ min. = ___ sec.
24. $\frac{3}{4}$ mile = ___ rd.
25. 1 mile = ___ ft.
26. $\frac{1}{2}$ acre = ___ sq. rd.
27. $\frac{3}{8}$ mile = ___ rd.
28. 72 hr. = ___ da.
29. $\frac{5}{6}$ hr. = ___ min.
30. $1\frac{1}{2}$ ft. = ___ yd.
31. $2\frac{1}{4}$ gal. = ___ qt.
32. 18 in. = ___ ft.
33. 1 rd. = ___ ft.
34. $1\frac{1}{3}$ yd. = ___ ft.
35. $1\frac{3}{4}$ ft. = ___ in.
36. $1\frac{3}{4}$ hr. = ___ min.
37. $\frac{1}{2}$ ton = ___ lb.
38. 24 in. = ___ yd.
39. $1\frac{3}{4}$ lb. = ___ oz.
40. 21 mo. = ___ yr.
41. $1\frac{1}{3}$ yr. = ___ mo.
42. 30 in. = ___ ft.
43. 1 gross = ___
44. 90 da. = ___ mo.
45. 1 sq. ft. = ___ sq. in.
46. 36 sq. ft. = ___ sq. yd.
47. 1 cu. yd. = ___ cu. ft.
48. 1 sq. yd. = ___ sq. ft.

Problem Test

Find the answer to each problem.

1. A man bought 2 cars of coal at \$8 per ton. One car held $38\frac{3}{8}$ T. and the other $42\frac{1}{2}$ T. What did the coal cost?

2. A clerk's salary is \$125 per month, and his expenses average \$95. How much does he save in a year?

3. Henry's school is $\frac{3}{4}$ mile from his home. He comes home at noon for his lunch. How far does he walk each day in going to and from school?

4. A man earns \$2400 a year and spends an average of \$177 per month. How much money does he save in a year?

5. Jim paid \$1.50 for 75 papers and sold them at 3¢ each. What was his profit on the 75 papers?

6. A clerk sold 6 dozen boxes of writing paper at 45¢ a box. How much money did he receive?

7. What is the cost of a dozen cans of vegetable soup at $8\frac{1}{2}$ cents a can?

8. I mailed two packages, one weighing $4\frac{3}{4}$ pounds and the other $1\frac{3}{4}$ pounds. What did both weigh?

9. When corn sells at 3 cans for 25¢, what is the cost of 5 dozen cans of corn?

10. What is the cost of $3\frac{3}{8}$ pounds of steak at 40¢ a pound and 14 pounds of ham at 29¢ a pound?

11. At \$85 an acre, what is the value of a piece of land 160 rd. long and 160 rd. wide?

12. A grocer bought 10 bushels of apples at 69¢ a bushel and sold them at 24¢ a peck. What was his profit?

13. Arthur's arithmetic scores on two tests were $10\frac{1}{2}$ and $11\frac{1}{2}$. What was his average score on the two tests?

Testing Your Readiness for Next Year's Work

Practice in Addition

If you can do the work in the following pages satisfactorily, you know that you are ready for the next grade.

Add downward. Check by adding upward.

1.

6	8	3	8	4	7	9	8	5
5	6	9	5	8	7	4	7	9
9	7	4	7	6	5	6	4	3

2.

4	8	5	7	9	8	7	6	9
2	9	8	9	6	8	3	7	9
6	8	7	4	6	9	8	5	2

3.

7	89	57	448	745	324	$48.63
6	45	86	963	94	3773	9.56
4	54	28	656	959	8696	26.49
9	43	65	894	387	7965	7.85

4.

8	56	48	236	538	2979	$7.48
7	49	69	867	836	6987	29.06
4	97	85	749	957	7292	.58
3	65	98	686	858	3945	3.17
7	54	69	598	76	8206	35.79

5.

3	57	38	268	319	135	$60.42
5	72	57	978	684	5863	4.80
9	63	84	787	726	2399	53.04
8	47	78	694	894	6725	26.99
5	36	49	561	57	4998	.67
7	63	95	356	949	1364	8.46

6. 624+53+86+16 20+23+10+19

Learning How to Use Large Numbers

1. Begin at the right and name the four periods in 45,759,634,539; then read the number.

2. Begin at the right and give the place names in 786; 4793; 24,689; 387,211; 25,680,456,348; 96,872,756; 653,502,065; and 9,548,428.

Write the following numbers:

3. Twenty thousand, eighty-two.

4. Seven hundred twelve thousand, two hundred ten.

5. Four million, two hundred sixty-five thousand, seven hundred eighty-nine.

6. Two hundred thirty-six million, four hundred seventy-five thousand, three hundred eight.

7. Read the following numbers:

4689	56,720	480,609	5,632,786	875,460,880
5206	30,408	807,017	2,085,904	673,046,003
7042	91,076	360,004	6,402,035	500,004,900

8. Multiply and read the products of the following:

10×10 10×100 100×100 $10 \times 10{,}000$ 1000×1000

9. Round off to the nearest thousand: 6016; 4180; 7516; and 8944.

10. Round off to the nearest ten-thousand: 73,876; 93,578; 58,439; 41,057; and 9437.

11. Round off to the nearest hundred-thousand: 516,704; 890,430; 328,008; 709,671; and 99,614.

12. Round off to the nearest million: 4,548,672; 1,907,468; 3,122,096; and 993,741.

13. Make a list, to be read in class, of large numbers you find in newspapers, magazines, or books.

Practice in Subtraction

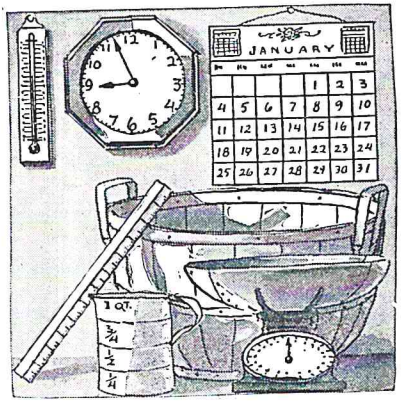
Subtract. To prove, add subtrahend and remainder.

1.	385	769	897	168	673	536	835
	62	534	93	75	39	57	348
2.	462	755	647	577	852	918	714
	397	669	157	299	528	496	308
3.	826	648	433	863	960	608	870
	718	139	237	359	348	274	689
4.	702	900	800	600	901	730	405
	168	368	499	307	408	280	86
5.	807	600	711	922	632	754	808
	94	78	489	419	223	345	709
6.	9468	7695	8795	6894	7876	8522	
	45	350	4763	2536	482	554	
7.	9851	7461	6064	4121	7860	8401	
	754	5377	459	3945	6963	4392	
8.	6012	8600	4001	8000	9000	7010	
	2003	3827	1943	2889	3999	6909	
9.	6020	8007	6003	7040	5112	6227	
	4018	3944	2009	3650	4789	3118	
10.	$76.93	$56.45	$39.71	$34.09	$97.11		
	2.84	34.65	19.17	13.26	27.44		

11. $49.04 − $8.79 $50.16 − $15.78 $36.92 − $28.68

12. 10773 − 6765 811 − 599 $48.11 − $7.98

Practice with Measures



1. How many kinds of measures are used in your home?

2. Tell how a railroad uses measures of time, of distance, of weight, of temperature, of cost, of dry measure, of area, of volume.

3. What measures are used in a grocery store? in a hardware store? on a farm?

4. How many different United States coins can you name? how many different values in paper money?

5. Name five men whose portraits and names are engraved on United States paper money.

Change the following to larger units of measure:

6.	2 pints	2 cups	4 quarts	3 feet
7.	7 days	4 pecks	8 quarts	5 cents
8.	12 months	12 inches	12 units	2 nickels
9.	16 ounces	10 cents	10 dimes	30 days
10.	20 units	25 cents	4 quarters	36 inches
11.	50 cents	100 cents	10 tens	5280 feet
12.	24 hours	100 years	60 minutes	60 seconds
13.	$5\frac{1}{2}$ yards	365 days	366 days	320 rods
14.	$16\frac{1}{2}$ feet	144 square inches		1728 cubic inches
15.	2000 pounds	160 square rods		27 cubic feet

16. Name the different units in each of the following kinds of measures: length or distance; weight; liquid measure; dry measure; volume or content; area or surface; time; temperature; money.

Practice in Multiplication

Multiply. Check by multiplying again.

1.	32 × 3	64 × 2	23 × 4	41 × 5	68 × 6	58 × 7	90 × 9	75 × 8
2.	32 × 23	27 × 34	48 × 62	93 × 86	75 × 49	72 × 57	95 × 82	81 × 79
3.	324 × 2	319 × 3	241 × 4	568 × 5	413 × 8	672 × 7	456 × 9	
4.	680 × 8	700 × 6	307 × 5	502 × 4	703 × 9	370 × 3	573 × 7	
5.	478 × 26	672 × 18	395 × 61	444 × 79	503 × 98	960 × 65	309 × 29	
6.	694 × 568	758 × 476	946 × 794	875 × 598	608 × 324	732 × 690	847 × 700	
7.	860 × 890	359 × 709	806 × 807	705 × 380	900 × 700	430 × 600	907 × 800	
8.	47×683	608×759	67×5609	753×897				
9.	\$.65 × 6	\$6.09 × 4	\$8.25 × 8	\$6.19 × 5	\$4.90 × 7	\$8.91 × 9		
10.	\$6.75 × 46	\$.64 × 53	\$9.07 × 58	\$5.39 × 72	\$4.29 × 86	\$2.69 × 49		
11.	3849 × 4	6708 × 8	3068 × 7	6270 × 9	7002 × 6	2085 × 5		
12.	8165 × 47	9507 × 82	4028 × 96	6913 × 57	7006 × 78	9171 × 35		

One-Step Problems

For each problem, write A, S, M, or D. Solve the problems.

1. Mary's mother bought a chair for $4.98, a desk for $14.65, and curtains for $3.25. Find the total cost of the furniture and curtains.

2. Edith has saved $14.95. She wants a bicycle costing $27.85. How much money does she still need?

3. Alfred's father bought 9 gallons of gasoline for $1.71. What was the price per gallon?

4. Jim's father bought 14 gallons of gasoline at 18¢ per gallon. What was the cost?

5. Mr. Davis bought a house for $8000 and later sold it for $9400. How much did he gain on the sale?

6. At an average speed of 47 miles per hour, how far will an automobile travel in 38 hours?

7. An airplane flew 1998 miles in 9 hours. What was the average speed per hour?

8. Six boys shared equally the expenses of a camping trip amounting to $45.75. Find each boy's share.

9. At $3.45 per square yard, what is the cost of laying 276 square yards of concrete pavement?

10. How many square feet are there in a floor 125 feet long and 64 feet wide?

11. At $8 per ton, how many tons of coal can be bought for $856?

12. Ed has 144 tomato plants to set in 9 equal rows. How many plants will he have for each row?

Practice in Division

Divide. To prove, multiply the quotient by the divisor and add the remainder.

1.	$3\overline{)9}$	$4\overline{)12}$	$3\overline{)11}$	$6\overline{)25}$	$7\overline{)30}$	$9\overline{)54}$
2.	$2\overline{)86}$	$3\overline{)42}$	$8\overline{)72}$	$7\overline{)96}$	$5\overline{)79}$	$6\overline{)84}$
3.	$8\overline{)99}$	$5\overline{)89}$	$6\overline{)96}$	$4\overline{)95}$	$9\overline{)40}$	$7\overline{)88}$
4.	$3\overline{)61}$	$5\overline{)53}$	$4\overline{)82}$	$9\overline{)97}$	$2\overline{)41}$	$5\overline{)80}$
5.	$2\overline{)486}$	$3\overline{)687}$	$4\overline{)564}$	$6\overline{)697}$	$7\overline{)357}$	
6.	$3\overline{)159}$	$6\overline{)306}$	$7\overline{)504}$	$9\overline{)873}$	$8\overline{)348}$	
7.	$4\overline{)274}$	$6\overline{)494}$	$7\overline{)257}$	$9\overline{)509}$	$6\overline{)148}$	
8.	$8\overline{)688}$	$7\overline{)553}$	$4\overline{)239}$	$8\overline{)459}$	$9\overline{)305}$	
9.	$5\overline{)484}$	$7\overline{)627}$	$3\overline{)918}$	$4\overline{)837}$	$6\overline{)423}$	
10.	$8\overline{)567}$	$5\overline{)304}$	$9\overline{)981}$	$8\overline{)406}$	$7\overline{)742}$	
11.	$6\overline{)500}$	$4\overline{)198}$	$9\overline{)336}$	$5\overline{)199}$	$8\overline{)207}$	
12.	$9\overline{)725}$	$8\overline{)833}$	$7\overline{)619}$	$5\overline{)188}$	$7\overline{)222}$	
13.	$4\overline{)1178}$	$5\overline{)1535}$	$3\overline{)2472}$	$5\overline{)2069}$	$8\overline{)7064}$	
14.	$9\overline{)3838}$	$7\overline{)5348}$	$4\overline{)3000}$	$6\overline{)3579}$	$5\overline{)4478}$	
15.	$8\overline{)1409}$	$9\overline{)7000}$	$7\overline{)6000}$	$5\overline{)2831}$	$4\overline{)7624}$	
16.	$3\overline{)2092}$	$8\overline{)1787}$	$9\overline{)1657}$	$4\overline{)1134}$	$7\overline{)5897}$	
17.	$2\overline{)\$18.34}$	$5\overline{)\$45.25}$	$7\overline{)\$20.65}$	$9\overline{)\$55.62}$	$6\overline{)\$59.64}$	
18.	$8\overline{)\$60.48}$	$9\overline{)\$80.01}$	$6\overline{)\$50.04}$	$7\overline{)\$32.13}$	$4\overline{)\$22.64}$	

Problem Practice

Always choose the operation to use before you try to solve a problem.

1. Jim's father was paid $255.75 for 31 days' work. How much did he earn per day?

2. At $125 per acre, what is a 160-acre farm worth?

3. At an average speed of 51 miles per hour, how many hours will it take to drive an auto 1139 miles?

4. What is the area of a floor 145 feet long and 96 feet wide?

5. Henry bought a suit for $17.45. What was his change from a $20 bill?

6. If 896 seats are placed in 32 equal rows, how many seats are there in each row?

7. If 42 peach trees are set in each row, how many rows are needed for 1218 trees?

8. How many apple trees are needed to make 36 rows with 25 trees in each row?

9. A certain train travels 2288 miles in 52 hours. What is its average speed per hour?

10. In traveling 1394 miles, an auto used 82 gal. of gasoline. What was the average number of miles per gallon?

11. A farm of 92 acres was sold for $6900. What was the average price per acre?

12. If an auto runs 19 miles on a gallon of gasoline, how far will it run on 27 gallons?

13. Mr. Wilson built a house for $6825 and a garage for $215 on a $1750 lot. Find the total cost.

14. How many rods of fencing will be needed for a pasture 48 rods long and 32 rods wide?

Divisors Ending in 0, 1, or 2

Divide. Prove your work.

1.	20)80	12)72	11)55	12)29	11)35
2.	30)240	41)164	12)150	11)495	21)147
3.	12)39	11)694	32)256	42)609	41)961
4.	11)109	12)107	21)179	32)290	62)508
5.	52)481	81)609	72)710	52)378	91)364
6.	32)192	61)643	22)148	92)556	51)224
7.	71)848	32)329	62)372	82)656	41)397
8.	62)454	81)755	61)489	52)598	71)486
9.	12)984	82)609	32)468	41)205	92)797
10.	52)408	51)592	22)190	71)409	61)549
11.	71)630	81)397	82)900	61)308	92)403
12.	62)809	92)891	51)536	41)919	32)800
13.	52)555	61)400	81)817	22)204	82)972
14.	32)6592	61)5207	52)4098	41)3098	72)6790
15.	21)819	42)3650	81)6004	62)4278	92)4420
16.	71)5200	22)1494	32)2784	91)5307	51)3278
17.	21)1538	82)5698	62)3594	72)4100	42)3796
18.	92)7800	32)1468	82)4756	52)5040	22)2101

Two-Step Problems

Take your time and solve each problem accurately.

1. On May 1 Louis' cash on hand was \$8.74. During the month he received \$7.25 and paid out \$9.48. What was his balance at the end of May?

2. Mr. Harrison bought 184 acres of land at \$85 an acre. He built a house for \$5750 and a barn for \$2400. Find the cost of the land and buildings.

3. What is your change from a \$10 bill if you buy a sweater for \$3.95 and a pair of roller skates for \$4.98?

4. A grocer paid \$3.65 for a case of 12 dozen oranges and sold them at 37¢ a dozen. How much did he gain?

5. An airplane traveling 155 miles per hour met a 35-mile headwind. After it met the headwind, how fast did it travel and what was its average rate per minute?

6. Ed bought a used bicycle for \$6.50, spent \$4.75 for repairs, and then sold it for \$14. What was his gain?

7. A field of 57 acres of corn averaged 49 bu. per acre. At 87¢ per bushel, what is the value of this corn?

8. Helen's mother bought a 12-lb. turkey at 32¢ a pound. What was her change from a \$5 bill?

9. Our baseball team paid \$8.95 for a suit and \$3.75 for shoes for each of the 9 players. Find the total cost.

10. An agent paid \$6500 for some land which he divided into 12 lots and sold at \$750 each. Find his gain.

11. Find the cost of 3 shirts at \$1.25 each, a hat at \$3.85, and a pair of shoes at \$4.95.

12. Ed bought a radio for \$19.95. He paid \$3.95 down. At \$4 a month, how long will he take to pay the balance?

13. Find the cost of 13 gallons of gasoline at 18¢ a gallon and 6 quarts of oil at 25¢ a quart.

Divisors Ending in 1, 2, 8, or 9

Divide. Prove your work.

1.	$19\overline{)209}$	$28\overline{)784}$	$18\overline{)846}$	$19\overline{)754}$	$18\overline{)1242}$
2.	$38\overline{)734}$	$18\overline{)460}$	$38\overline{)646}$	$19\overline{)724}$	$38\overline{)3572}$
3.	$39\overline{)666}$	$19\overline{)840}$	$39\overline{)987}$	$28\overline{)861}$	$28\overline{)1736}$
4.	$29\overline{)559}$	$38\overline{)609}$	$92\overline{)510}$	$39\overline{)788}$	$19\overline{)1102}$
5.	$48\overline{)450}$	$92\overline{)818}$	$48\overline{)357}$	$49\overline{)311}$	$29\overline{)1867}$
6.	$42\overline{)400}$	$31\overline{)981}$	$49\overline{)409}$	$92\overline{)650}$	$28\overline{)1660}$
7.	$802 \div 91$	$360 \div 38$	$864 \div 48$	$1380 \div 19$	
8.	$342 \div 39$	$343 \div 49$	$682 \div 48$	$1449 \div 18$	
9.	$750 \div 49$	$288 \div 48$	$565 \div 71$	$1102 \div 29$	
10.	$240 \div 48$	$985 \div 39$	$159 \div 49$	$2200 \div 38$	
11.	$244 \div 39$	$898 \div 62$	$239 \div 38$	$2401 \div 49$	
12.	$704 \div 88$	$607 \div 98$	$622 \div 99$	$5316 \div 79$	
13.	$59\overline{)13806}$	$39\overline{)13611}$	$58\overline{)26696}$	$68\overline{)13267}$	
14.	$68\overline{)27687}$	$59\overline{)12154}$	$69\overline{)35604}$	$79\overline{)34158}$	
15.	$98\overline{)49686}$	$78\overline{)70533}$	$69\overline{)53979}$	$58\overline{)48662}$	
16.	$59\overline{)30001}$	$79\overline{)40944}$	$89\overline{)31862}$	$78\overline{)56800}$	
17.	$58\overline{)29986}$	$98\overline{)31204}$	$68\overline{)25024}$	$99\overline{)30501}$	
18.	$88\overline{)62040}$	$99\overline{)47421}$	$69\overline{)30291}$	$89\overline{)55711}$	
19.	$99\overline{)50094}$	$79\overline{)55094}$	$59\overline{)42441}$	$89\overline{)36470}$	

Problems with Two or More Steps

Take your time and solve each problem accurately.

1. Mary earned $1.25 a week for 9 weeks. After paying $4.50 for a sweater, how much money did she have left?

2. Five boys rented a boat for 4 days at 75¢ a day. What was each boy's share of the rent?

3. It cost Walter $18.65 to raise 84 bu. of potatoes, which he sold for $1.05 a bushel. Find his gain.

4. Four horses weighed 1275 lb., 1160 lb., 1320 lb., and 1485 lb. What was the average weight?

5. An auto speedometer read 5680 mi., and 8 hr. later it read 5992 mi. Find the average speed per hour.

6. Our car averages 18 mi. per gallon of gas. At 19¢ per gallon, what will gasoline cost for a 720-mile trip?

7. Mr. Clark earns $4200 a year and spends an average of $275 per month. How much does he save in a year?

8. After driving 720 mi. of a 1170-mi. trip, how long will it take a man to finish the trip at an average of 50 mi. per hour?

9. A dealer bought 9 cars at $656.50 each and sold them for $810 each. How much did he make on these cars?

10. Working 40 hours per week at 95¢ an hour, what does a man earn in 49 weeks?

11. At $2.96 per square yard, what will it cost to lay a cement walk 96 feet long and 3 feet wide?

12. How many cubic yards of earth must be removed in digging a hole 45 ft. by 27 ft. by 4 ft. for a basement?

13. At $150 an acre, what is the value of a piece of land 60 rods long and 40 rods wide?

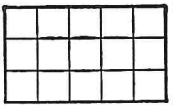
Divisors Ending in 3, 4, 5, 6, and 7

Divide. Prove your division.

1.	13)273	14)504	15)930	43)631	15)1425
2.	14)820	93)594	34)612	25)561	14)1237
3.	64)579	97)609	23)621	76)522	16)1509
4.	94)750	24)912	85)701	17)655	17)1204
5.	76)713	54)3586	43)1978	16)1407	26)1900
6.	55)2021	46)1777	33)1088	26)1253	27)2430
7.	2220 ÷ 27	1618 ÷ 34	1253 ÷ 73	1491 ÷ 25	
8.	1394 ÷ 36	4275 ÷ 45	5300 ÷ 56	1980 ÷ 35	
9.	3315 ÷ 47	3231 ÷ 85	7485 ÷ 36	4814 ÷ 83	
10.	2040 ÷ 53	7012 ÷ 64	5185 ÷ 63	6996 ÷ 64	
11.	8170 ÷ 86	3404 ÷ 46	8088 ÷ 85	2714 ÷ 46	
12.	1550 ÷ 26	4905 ÷ 65	2229 ÷ 57	5299 ÷ 94	
13.	4689 ÷ 93	5914 ÷ 44	8501 ÷ 43	1489 ÷ 24	
14.	3875 ÷ 55	2517 ÷ 66	6324 ÷ 67	3117 ÷ 26	
15.	45)9324	97)6984	76)4980	74)4304	87)7507
16.	75)6975	66)3136	86)6039	84)5074	76)9348
17.	65)3908	74)5348	94)7889	44)4811	73)9348
18.	66)5201	93)6882	84)8209	37)3543	95)7804
19.	37)7679	57)6166	96)4608	16)9664	75)5830
20.	64)6309	96)5588	84)5750	95)4655	77)6411

Finding Areas and Volumes

1. Draw a rectangle 5 in. long and 3 in. wide. Then draw lines to show 3 rows of 1-inch squares, with 5 squares in each row.



2. What are the dimensions of the figure you drew? What is the area? How do you find the perimeter?

3. Draw two rectangles, one 6 in. by 4 in. and the other 8 in. by 3 in. Which rectangle has the larger area? Find the perimeter of each.

4. Which has the larger area, a 6-in. square or a rectangle 4 in. by 9 in.? Which has the greater perimeter?

5. How many square feet of carpet would be needed to cover a closet 24 in. by 36 in.?

6. How many square yards are contained in a rug 12 feet by 15 feet?

7. How many square feet are there in a rug 3 yards wide and 4 yards long?

8. Draw a square 3 in. long and 3 in. wide. Divide it into small squares to represent the number of square feet in 1 square yard.

9. Change to square inches: 2 sq. ft. 5 sq. ft.

10. Change to square feet: 4 sq. yd. 8 sq. yd.

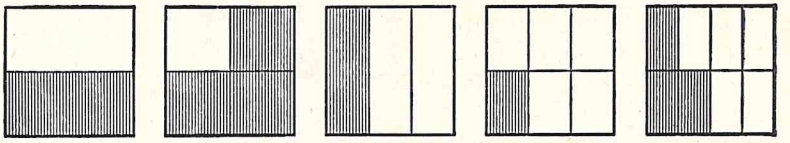
11. Change to acres: 320 sq. rd. 640 sq. rd. 960 sq. rd.

12. Name the dimensions of a room 18 ft. long, 14 ft. wide, and 9 ft. high. Find the volume of the room.

13. What is the volume of a box 16 in. long, 11 in. wide, and 6 in. deep? Name the 3 dimensions of the box.

14. How many cubic feet are there in 1 cu. yd.?

Working with Fractions



1. What fraction of each figure above is shaded?

2. What fraction of each figure is not shaded?

3. In $\frac{3}{4}$, what does the denominator tell? What does the numerator tell?

4. Why are $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{7}{8}$ in lowest terms?

5. Which of these fractions are in their lowest terms?

$\frac{10}{12}$ $\frac{7}{12}$ $\frac{4}{5}$ $\frac{6}{15}$ $\frac{3}{16}$ $\frac{2}{9}$ $\frac{1}{10}$ $\frac{8}{15}$ $\frac{12}{16}$

6. Reduce these fractions to their lowest terms:

$\frac{2}{4}$ $\frac{4}{8}$ $\frac{2}{8}$ $\frac{6}{8}$ $\frac{2}{6}$ $\frac{4}{6}$ $\frac{3}{9}$ $\frac{6}{9}$ $\frac{2}{10}$ $\frac{3}{12}$

$\frac{4}{12}$ $\frac{10}{16}$ $\frac{5}{10}$ $\frac{6}{10}$ $\frac{6}{12}$ $\frac{8}{12}$ $\frac{9}{12}$ $\frac{12}{16}$ $\frac{8}{16}$ $\frac{14}{16}$

7. Draw and shade parts of a rectangle to show each of these fractions: $\frac{5}{6}$ $\frac{7}{12}$ $\frac{4}{5}$ $\frac{6}{15}$ $\frac{3}{16}$ $\frac{1}{10}$ $\frac{12}{16}$.

8. Why is $\frac{2}{3}$ a proper fraction? Why are $\frac{3}{3}$ and $\frac{4}{3}$ improper fractions? Why are $2\frac{3}{4}$ and $42\frac{2}{3}$ mixed numbers?

9. How do you change $\frac{15}{20}$ to lowest terms?

10. How do you change $2\frac{3}{4}$ to an improper fraction?

11. Change these mixed numbers to improper fractions:

$3\frac{1}{2}$ $2\frac{2}{3}$ $1\frac{3}{4}$ $3\frac{3}{5}$ $2\frac{1}{8}$ $1\frac{7}{8}$ $2\frac{3}{10}$ $3\frac{5}{12}$

12. How do you change $\frac{7}{6}$ and $\frac{8}{6}$ to mixed numbers?

13. Change these improper fractions to whole or to mixed numbers: $\frac{2}{2}$ $\frac{3}{2}$ $\frac{3}{3}$ $\frac{4}{3}$ $\frac{9}{4}$ $\frac{12}{4}$ $\frac{15}{8}$ $\frac{16}{8}$

14. Change $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{3}{4}$ to eighths.

15. Change $\frac{1}{2}$ and $\frac{2}{3}$ to sixths; $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, and $\frac{5}{6}$ to twelfths.

Adding Like Fractions and Mixed Numbers

1.

$\frac{1}{2}$	$\frac{1}{4}$	$\frac{4}{5}$	$\frac{1}{6}$	$\frac{1}{8}$	$\frac{8}{9}$	$\frac{1}{10}$	$\frac{11}{12}$
$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{1}{9}$	$\frac{9}{10}$	$\frac{1}{12}$

2.

$\frac{1}{8}$	$\frac{3}{10}$	$\frac{1}{3}$	$\frac{5}{12}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{16}$	$\frac{3}{8}$
$\frac{3}{8}$	$\frac{7}{10}$	$\frac{1}{3}$	$\frac{5}{12}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{5}{16}$	$\frac{1}{8}$

3.

$\frac{7}{8}$	$\frac{1}{5}$	$\frac{11}{12}$	$\frac{3}{5}$	$\frac{5}{8}$	$\frac{5}{16}$	$\frac{3}{5}$	$\frac{11}{12}$
$\frac{7}{8}$	$\frac{3}{5}$	$\frac{5}{12}$	$\frac{4}{5}$	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{5}$	$\frac{11}{12}$

4.

$\frac{7}{10}$	$\frac{1}{3}$	$\frac{5}{8}$	$\frac{13}{16}$	$\frac{1}{5}$	$\frac{7}{10}$	$\frac{3}{8}$	$\frac{3}{10}$
$\frac{7}{10}$	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{3}{16}$	$\frac{2}{5}$	$\frac{9}{10}$	$\frac{5}{8}$	$\frac{3}{10}$

5.

$\frac{5}{6}$	$\frac{2}{3}$	$\frac{5}{16}$	$\frac{7}{10}$	$\frac{5}{12}$	$\frac{7}{16}$	$\frac{2}{5}$	$\frac{7}{12}$
$\frac{5}{6}$	$\frac{2}{3}$	$\frac{7}{16}$	$\frac{9}{10}$	$\frac{1}{12}$	$\frac{9}{16}$	$\frac{3}{5}$	$\frac{11}{12}$

6.

$\frac{11}{16}$	$\frac{2}{5}$	$\frac{4}{9}$	$\frac{7}{8}$	$\frac{3}{10}$	$\frac{3}{5}$	$\frac{9}{10}$	$\frac{3}{8}$
$\frac{9}{16}$	$\frac{2}{5}$	$\frac{5}{9}$	$\frac{5}{8}$	$\frac{9}{10}$	$\frac{3}{5}$	$\frac{9}{10}$	$\frac{7}{8}$

7. $\frac{3}{16}+\frac{1}{16}$ $\quad$ $\frac{5}{16}+\frac{11}{16}$ $\quad$ $\frac{3}{9}+\frac{3}{9}$ $\quad$ $\frac{9}{16}+\frac{9}{16}$ $\quad$ $\frac{3}{16}+\frac{7}{16}$

8. $\frac{5}{16}+\frac{9}{16}$ $\quad$ $\frac{11}{16}+\frac{11}{16}$ $\quad$ $\frac{1}{12}+\frac{7}{12}$ $\quad$ $\frac{7}{16}+\frac{11}{16}$ $\quad$ $\frac{5}{16}+\frac{5}{16}$

9. $\frac{11}{16}+\frac{9}{16}$ $\quad$ $\frac{3}{16}+\frac{13}{16}$ $\quad$ $\frac{2}{5}+\frac{4}{5}$ $\quad$ $\frac{7}{16}+\frac{7}{16}$ $\quad$ $\frac{9}{16}+\frac{13}{16}$

10.

$3\frac{1}{4}$	$\frac{1}{2}$	$2\frac{2}{3}$	$3\frac{1}{4}$	$2\frac{5}{6}$	$3\frac{4}{5}$	$5\frac{3}{5}$
$\frac{3}{4}$	$2\frac{1}{2}$	$\frac{2}{3}$	$2\frac{1}{4}$	$\frac{1}{6}$	$1\frac{3}{5}$	$4\frac{3}{5}$

11.

$3\frac{1}{8}$	$1\frac{3}{4}$	$4\frac{5}{12}$	$3\frac{7}{10}$	$1\frac{3}{8}$	$3\frac{1}{12}$	$3\frac{5}{8}$
$2\frac{1}{8}$	$\frac{3}{4}$	$\frac{7}{12}$	$2\frac{3}{10}$	$\frac{5}{8}$	$2\frac{5}{12}$	$4\frac{7}{8}$

12.

$2\frac{1}{6}$	$4\frac{5}{8}$	$3\frac{3}{5}$	$5\frac{7}{12}$	$2\frac{3}{10}$	$5\frac{7}{10}$	$6\frac{3}{8}$
$2\frac{5}{6}$	$3\frac{5}{8}$	$\frac{2}{5}$	$3\frac{11}{12}$	$4\frac{1}{10}$	$3\frac{7}{10}$	$2\frac{1}{8}$

A Good Family Diet

Mr. and Mrs. Brown were talking about the food they should buy each week to get the best quality of food which they could afford for their family of four.

After reading the suggestions made in some government bulletins, they decided that their needs for a week should include the items shown below:

	Esther	Bob	Mrs. Brown	Mr. Brown
Milk	7 qt.	7 qt.	$3\frac{1}{2}$ qt.	$3\frac{1}{2}$ qt.
Potatoes	2 lb.	$2\frac{1}{4}$ lb.	$2\frac{1}{2}$ lb.	$5\frac{3}{4}$ lb.
Fruits	3 lb.	$3\frac{3}{4}$ lb.	4 lb.	$5\frac{1}{4}$ lb.
Vegetables	$4\frac{3}{4}$ lb.	$5\frac{1}{4}$ lb.	$6\frac{1}{4}$ lb.	6 lb.
Eggs	$\frac{7}{12}$ doz.	$\frac{7}{12}$ doz.	$\frac{1}{2}$ doz.	$\frac{5}{12}$ doz.
Meat and fish	$1\frac{1}{2}$ lb.	2 lb.	$2\frac{1}{2}$ lb.	4 lb.
Bread and cereals	2 lb.	$2\frac{1}{2}$ lb.	$2\frac{3}{4}$ lb.	$5\frac{3}{4}$ lb.
Sugar and sweets	$\frac{1}{2}$ lb.	$\frac{3}{4}$ lb.	1 lb.	2 lb.
Butter and fats	$\frac{9}{16}$ lb.	$\frac{3}{4}$ lb.	1 lb.	$1\frac{15}{16}$ lb.

1. How many quarts of milk would Mrs. Brown have to get each day to meet her family needs?

2. How many pounds of sugar and sweets, butter and fats would she have to order each week?

3. How much more meat and fish and potatoes did Mr. and Mrs. Brown need than Esther and Bob?

4. What would be the total amount of bread and cereals which the four members of the family would use?

5. How many pounds more of vegetables than of fruit would Mrs. Brown order for her family each week?

6. How many dozen eggs would they need each week?

Subtraction of Like Fractions

Subtract, and reduce the remainders to lowest terms.

1.	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{4}{5}$	$\frac{5}{12}$	$\frac{7}{8}$	$\frac{3}{10}$	$\frac{5}{6}$	$\frac{6}{7}$
	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{2}{5}$	$\frac{1}{12}$	$\frac{1}{8}$	$\frac{1}{10}$	$\frac{1}{6}$	$\frac{3}{7}$
2.	$\frac{3}{5}$	$\frac{5}{8}$	$\frac{6}{7}$	$\frac{7}{12}$	$\frac{5}{9}$	$\frac{9}{16}$	$\frac{5}{7}$	$\frac{7}{9}$
	$\frac{1}{5}$	$\frac{3}{8}$	$\frac{2}{7}$	$\frac{1}{12}$	$\frac{2}{9}$	$\frac{1}{16}$	$\frac{1}{7}$	$\frac{2}{9}$
3.	$\frac{8}{9}$	$\frac{11}{12}$	$\frac{7}{8}$	$\frac{5}{16}$	$\frac{9}{10}$	$\frac{11}{16}$	$\frac{8}{9}$	$\frac{7}{10}$
	$\frac{7}{9}$	$\frac{1}{12}$	$\frac{3}{8}$	$\frac{3}{16}$	$\frac{3}{10}$	$\frac{3}{16}$	$\frac{2}{9}$	$\frac{3}{10}$
4.	$\frac{7}{8}$	$\frac{4}{5}$	$\frac{5}{8}$	$\frac{9}{16}$	$\frac{7}{24}$	$\frac{11}{12}$	$\frac{7}{16}$	$\frac{9}{10}$
	$\frac{5}{8}$	$\frac{1}{5}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{5}{24}$	$\frac{5}{12}$	$\frac{3}{16}$	$\frac{3}{10}$
5.	$\frac{11}{16}$	$\frac{9}{10}$	$\frac{15}{16}$	$\frac{9}{16}$	$\frac{7}{12}$	$\frac{11}{12}$	$\frac{15}{16}$	$\frac{11}{24}$
	$\frac{5}{16}$	$\frac{1}{10}$	$\frac{11}{16}$	$\frac{5}{16}$	$\frac{5}{12}$	$\frac{7}{12}$	$\frac{7}{16}$	$\frac{5}{24}$
6.	$\frac{3}{20}$	$\frac{8}{9}$	$\frac{9}{16}$	$\frac{7}{10}$	$\frac{11}{16}$	$\frac{7}{15}$	$\frac{9}{10}$	$\frac{7}{16}$
	$\frac{1}{20}$	$\frac{5}{9}$	$\frac{7}{16}$	$\frac{1}{10}$	$\frac{9}{16}$	$\frac{4}{15}$	$\frac{7}{10}$	$\frac{5}{16}$

Subtract the following mixed numbers:

7.	$6\frac{7}{8}$	$8\frac{5}{6}$	4	6	5	3	9
	$\frac{3}{8}$	$2\frac{5}{6}$	$\frac{1}{2}$	$2\frac{2}{3}$	$3\frac{3}{4}$	$2\frac{1}{8}$	$4\frac{5}{12}$
8.	$4\frac{2}{3}$	$4\frac{1}{3}$	$6\frac{3}{4}$	$6\frac{1}{4}$	$5\frac{7}{8}$	$4\frac{3}{8}$	$5\frac{5}{8}$
	$1\frac{1}{3}$	$1\frac{2}{3}$	$2\frac{1}{4}$	$2\frac{3}{4}$	$3\frac{3}{8}$	$1\frac{7}{8}$	$4\frac{7}{8}$
9.	$6\frac{5}{6}$	$5\frac{1}{6}$	$3\frac{1}{8}$	$7\frac{7}{8}$	$5\frac{1}{8}$	$4\frac{3}{8}$	$9\frac{1}{8}$
	$3\frac{1}{6}$	$2\frac{5}{6}$	$1\frac{3}{8}$	$2\frac{1}{8}$	$2\frac{7}{8}$	$1\frac{5}{8}$	$4\frac{5}{8}$
10.	$8\frac{4}{5}$	$7\frac{1}{5}$	$8\frac{1}{10}$	$8\frac{9}{10}$	$6\frac{1}{10}$	$5\frac{1}{12}$	$6\frac{5}{12}$
	$2\frac{1}{5}$	$3\frac{4}{5}$	$4\frac{3}{10}$	$7\frac{1}{10}$	$5\frac{9}{10}$	$2\frac{5}{12}$	$3\frac{7}{12}$

A Short Form for Addition of Unlike Fractions

1. Add $6\frac{3}{4}$ and $3\frac{5}{8}$.

$6\frac{3}{4}$	6
$3\frac{5}{8}$	5
$10\frac{3}{8}$	$\frac{11}{8}$

Change $\frac{3}{4}$ to $\frac{6}{8}$. Write the numerator 6 for $\frac{6}{8}$ and the numerator 5 for $\frac{5}{8}$, as shown.

Think $\frac{6}{8}+\frac{5}{8}$. Write $\frac{11}{8}$.

Think $\frac{11}{8}=1\frac{3}{8}$. Write $\frac{3}{8}$ in the sum and carry 1 to ones' column. Write 10.

Study the steps in each example below. Then copy them without the work, close your book, and add. If you make mistakes, correct them.

2.

$\frac{5}{6}$	5	$3\frac{2}{3}$	8	$2\frac{7}{10}$	7	$4\frac{5}{6}$	20
$\frac{2}{3}$	4	$1\frac{3}{4}$	9	$6\frac{3}{5}$	6	$3\frac{7}{8}$	21
$1\frac{1}{2}$	$\frac{9}{6}$	$5\frac{5}{12}$	$\frac{17}{12}$	$9\frac{3}{10}$	$\frac{13}{10}$	$8\frac{17}{24}$	$\frac{41}{24}$

3.

$3\frac{4}{5}$	12	$14\frac{3}{4}$	12	$8\frac{1}{6}$	5	$4\frac{3}{5}$	12
$5\frac{2}{3}$	10	$9\frac{11}{16}$	11	$7\frac{2}{5}$	12	$2\frac{3}{4}$	15
$9\frac{7}{15}$	$\frac{22}{15}$	$24\frac{7}{16}$	$\frac{23}{16}$	$15\frac{17}{30}$	$\frac{17}{30}$	$7\frac{7}{20}$	$\frac{27}{20}$

4.

$6\frac{3}{4}$	9	$3\frac{5}{8}$	15	$2\frac{9}{10}$	18	$5\frac{1}{3}$	7
$2\frac{5}{6}$	10	$2\frac{11}{12}$	22	$6\frac{3}{4}$	15	$4\frac{3}{7}$	9
$9\frac{7}{12}$	$\frac{19}{12}$	$6\frac{13}{24}$	$\frac{37}{24}$	$9\frac{13}{20}$	$\frac{33}{20}$	$9\frac{16}{21}$	$\frac{16}{21}$

5.

$6\frac{1}{2}$	4	$3\frac{2}{5}$	4	$5\frac{3}{4}$	15	$2\frac{1}{2}$	6
$2\frac{3}{4}$	6	$1\frac{3}{10}$	3	$4\frac{1}{2}$	10	$4\frac{1}{6}$	2
$1\frac{7}{8}$	7	$4\frac{1}{2}$	5	$3\frac{4}{5}$	16	$3\frac{1}{4}$	3
$11\frac{1}{8}$	$\frac{17}{8}$	$9\frac{1}{5}$	$\frac{12}{10}$	$14\frac{1}{20}$	$\frac{41}{20}$	$9\frac{11}{12}$	$\frac{11}{12}$

6.

$3\frac{2}{3}$	8	$3\frac{2}{3}$	12	$5\frac{3}{8}$	9	$3\frac{7}{10}$	14
$\frac{5}{6}$	10	$2\frac{5}{6}$	15	$2\frac{5}{6}$	20	$5\frac{3}{4}$	15
$6\frac{3}{4}$	9	$1\frac{8}{9}$	16	$4\frac{2}{3}$	16	$2\frac{1}{5}$	4
$11\frac{1}{4}$	$\frac{27}{12}$	$8\frac{7}{18}$	$\frac{43}{18}$	$12\frac{7}{8}$	$\frac{45}{24}$	$11\frac{13}{20}$	$\frac{33}{20}$

7. $2\frac{5}{6}+7\frac{2}{9}$ $\quad 4\frac{2}{3}+2\frac{4}{9}$ $\quad 4\frac{5}{12}+6\frac{1}{6}$ $\quad 7\frac{2}{3}+5\frac{5}{8}$

Sight Problems

1. What fraction of 40 is 16?

2. Change 1 lb. 14 oz. to ounces.

3. Find $1\frac{1}{4}+\frac{1}{2}$ $1\frac{1}{4}-\frac{1}{2}$ $1\frac{1}{4}\times 2$

4. What is the average of 7, 11, and 9?

5. Find the quotients: $8\div 4$, $4\overline{)8}$, and $\frac{8}{4}$.

6. Change $\frac{2}{3}$ and $\frac{7}{8}$ to fractions having a common denominator.

7. From 11 A.M. to 2:30 P.M. = ___ hr. ___ min.

8. Write two million, forty-nine thousand in figures.

9. When it is noon at New York, is it 1 hour before noon or after noon at Chicago?

10. What are the area and the perimeter of a room 10 ft. wide and 13 ft. long?

11. What is the perimeter of a floor 15 ft. long and 12 ft. wide?

12. A gallon of water weighs about $8\frac{1}{3}$ lb. What is the weight of 5 gallons of water?

13. When soup sells at 2 cans for 15¢, what would you have to pay for 1 can of soup?

14. If you make a purchase of 51¢, what 7 coins could you get in change from a dollar?

15. When salmon sells at 2 cans for 63¢, what is the cost of 6 cans of salmon?

16. Write each of these fractions in its simplest form:
$1\frac{3}{9}$ $\frac{6}{8}$ $2\frac{5}{6}$ $\frac{15}{3}$ $\frac{14}{4}$ $\frac{20}{6}$ $\frac{11}{16}$ $\frac{10}{12}$ $\frac{10}{2}$

17. Change $\frac{12}{5}$, $\frac{20}{8}$, $\frac{14}{3}$ to mixed numbers.

18. Change $3\frac{7}{8}$, $9\frac{4}{5}$, $2\frac{5}{12}$ to improper fractions.

Addition of Unlike Fractions

1.

$\frac{1}{2}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{16}$	$\frac{5}{8}$	$\frac{3}{5}$	$\frac{1}{4}$
$\frac{7}{8}$	$\frac{3}{8}$	$\frac{3}{10}$	$\frac{5}{12}$	$\frac{3}{4}$	$\frac{1}{2}$	$\frac{9}{10}$	$\frac{1}{5}$

2.

$\frac{1}{8}$	$\frac{7}{12}$	$\frac{5}{8}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{1}{6}$	$\frac{3}{4}$
$\frac{1}{6}$	$\frac{17}{24}$	$\frac{13}{16}$	$\frac{1}{12}$	$\frac{1}{5}$	$\frac{1}{2}$	$\frac{3}{8}$	$\frac{9}{20}$

3.

$\frac{7}{8}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{7}{10}$	$\frac{2}{3}$	$\frac{5}{6}$	$\frac{7}{24}$	$\frac{2}{3}$
$\frac{5}{6}$	$\frac{11}{24}$	$\frac{7}{12}$	$\frac{4}{5}$	$\frac{1}{8}$	$\frac{2}{3}$	$\frac{7}{8}$	$\frac{7}{8}$

4.

$3\frac{7}{10}$	$7\frac{8}{9}$	$5\frac{3}{4}$	$8\frac{1}{2}$	$2\frac{2}{5}$	$4\frac{5}{6}$	$6\frac{6}{12}$
$5\frac{3}{5}$	$2\frac{1}{6}$	$3\frac{2}{3}$	$1\frac{13}{24}$	$5\frac{1}{2}$	$7\frac{5}{8}$	$3\frac{3}{4}$

5.

$4\frac{15}{16}$	$6\frac{5}{6}$	$3\frac{11}{18}$	$1\frac{5}{24}$	$4\frac{2}{3}$	$2\frac{11}{16}$	$5\frac{3}{10}$
$2\frac{1}{4}$	$7\frac{3}{4}$	$3\frac{2}{3}$	$1\frac{5}{6}$	$5\frac{5}{8}$	$4\frac{3}{8}$	$2\frac{11}{20}$

6.

$6\frac{9}{16}$	$2\frac{5}{6}$	$4\frac{3}{5}$	$5\frac{3}{10}$	$4\frac{7}{8}$	$2\frac{4}{9}$	$3\frac{3}{4}$
$3\frac{3}{4}$	$5\frac{5}{12}$	$1\frac{2}{3}$	$3\frac{3}{4}$	$2\frac{5}{6}$	$3\frac{2}{3}$	$1\frac{4}{5}$

7.

$4\frac{2}{3}$	$3\frac{3}{4}$	$4\frac{1}{2}$	$2\frac{7}{8}$	$6\frac{3}{4}$	$9\frac{3}{4}$	$2\frac{3}{10}$
$3\frac{1}{2}$	$4\frac{5}{8}$	$2\frac{1}{3}$	$6\frac{3}{4}$	$2\frac{7}{8}$	$7\frac{2}{5}$	$3\frac{1}{2}$
5	$2\frac{1}{4}$	$5\frac{1}{4}$	$1\frac{5}{16}$	$4\frac{1}{2}$	$5\frac{7}{10}$	$\frac{4}{5}$

8.

$7\frac{5}{6}$	$2\frac{3}{4}$	$3\frac{2}{3}$	$6\frac{2}{3}$	$5\frac{1}{5}$	$\frac{4}{9}$	$5\frac{11}{12}$
$3\frac{1}{2}$	$4\frac{3}{8}$	$3\frac{1}{2}$	$3\frac{5}{8}$	$6\frac{2}{3}$	$3\frac{2}{3}$	$9\frac{1}{6}$
$8\frac{3}{4}$	$7\frac{5}{6}$	$4\frac{5}{6}$	$5\frac{11}{12}$	$3\frac{8}{15}$	$4\frac{1}{3}$	$3\frac{2}{3}$

9.

$5\frac{5}{8}$	$2\frac{1}{2}$	$7\frac{5}{6}$	$6\frac{2}{5}$	$3\frac{1}{3}$	$5\frac{1}{6}$	$4\frac{7}{12}$
$7\frac{1}{2}$	$5\frac{3}{4}$	$4\frac{9}{12}$	$2\frac{9}{10}$	$4\frac{3}{4}$	$2\frac{3}{8}$	$6\frac{5}{6}$
$4\frac{9}{16}$	$5\frac{3}{10}$	$3\frac{1}{2}$	$5\frac{1}{2}$	$6\frac{5}{12}$	$4\frac{7}{24}$	$3\frac{3}{4}$

10. $6\frac{7}{8}+3\frac{1}{6}$ $\quad 2\frac{3}{4}+5\frac{15}{16}$ $\quad 8\frac{1}{4}+6\frac{2}{5}$ $\quad 4\frac{7}{8}+3\frac{3}{8}$

A Short Form for Subtraction of Mixed Numbers

1. Subtract $4\frac{1}{2}$ from $8\frac{1}{3}$.

$8\frac{1}{3}$	8
$4\frac{1}{2}$	3
$3\frac{5}{6}$	$\frac{5}{6}$

You cannot take $\frac{1}{2}$ from $\frac{1}{3}$, so you add 1, or $\frac{3}{3}$, to $\frac{1}{3}$ to make $\frac{4}{3}$.

Change $\frac{4}{3}$ and $\frac{1}{2}$ to 6ths. Write the numerator 8 for $\frac{8}{6}$ and the numerator 3 for $\frac{3}{6}$. Then subtract. $\frac{8}{6}-\frac{3}{6}=\frac{5}{6}$. $7-4=3$.

2. Subtract $3\frac{7}{8}$ from 9.

9	8
$3\frac{7}{8}$	7
$5\frac{1}{8}$	$\frac{1}{8}$

Take 1 from 9 to make $\frac{8}{8}$. Write 8 for $\frac{8}{8}$ and 7 for $\frac{7}{8}$. $\frac{8}{8}-\frac{7}{8}=\frac{1}{8}$. $8-3=5$.

3. Study the work in each example below:

5 | 12	6 | 5	10 | 10	7 | 16
$\frac{7}{12}$ | 7	$5\frac{3}{5}$ | 3	$3\frac{3}{10}$ | 3	$3\frac{7}{16}$ | 7
$4\frac{5}{12}$ | $\frac{5}{12}$	$\frac{2}{5}$ | $\frac{2}{5}$	$6\frac{7}{10}$ | $\frac{7}{10}$	$3\frac{9}{16}$ | $\frac{9}{16}$

Study the steps in each example below:

4.

$7\frac{1}{3}$ | 8	$8\frac{3}{8}$ | 11	$4\frac{5}{6}$ | 20	$9\frac{5}{12}$ | 34
$4\frac{5}{6}$ | 5	$7\frac{3}{4}$ | 6	$3\frac{5}{8}$ | 15	$4\frac{7}{8}$ | 21
$2\frac{1}{2}$ | $\frac{3}{6}$	$\frac{5}{8}$ | $\frac{5}{8}$	$1\frac{5}{24}$ | $\frac{5}{24}$	$4\frac{13}{24}$ | $\frac{13}{24}$

5.

$9\frac{4}{5}$ | 16	$7\frac{1}{4}$ | 25	$8\frac{3}{10}$ | 13	$4\frac{5}{12}$ | 17
$3\frac{1}{4}$ | 5	$4\frac{4}{5}$ | 16	$2\frac{7}{10}$ | 7	$3\frac{11}{12}$ | 11
$6\frac{11}{20}$ | $\frac{11}{20}$	$2\frac{9}{20}$ | $\frac{9}{20}$	$5\frac{3}{5}$ | $\frac{6}{10}$	$\frac{1}{2}$ | $\frac{6}{12}$

6.

$10\frac{7}{8}$ | 7	$10\frac{1}{4}$ | 10	$4\frac{1}{6}$ | 7	$14\frac{3}{8}$ | 11
$6\frac{1}{4}$ | 2	$6\frac{7}{8}$ | 7	$2\frac{5}{6}$ | 5	$9\frac{5}{8}$ | 5
$4\frac{5}{8}$ | $\frac{5}{8}$	$3\frac{3}{8}$ | $\frac{3}{8}$	$1\frac{1}{3}$ | $\frac{2}{6}$	$4\frac{3}{4}$ | $\frac{6}{8}$

7.

$5\frac{1}{16}$ | 17	$6\frac{3}{10}$ | 26	$4\frac{5}{8}$ | 39	$7\frac{1}{5}$ | 18
$2\frac{3}{8}$ | 6	$2\frac{2}{5}$ | 8	$3\frac{11}{12}$ | 22	$4\frac{1}{3}$ | 5
$2\frac{11}{16}$ | $\frac{11}{16}$	$3\frac{9}{10}$ | $\frac{18}{20}$	$\frac{17}{24}$ | $\frac{17}{24}$	$2\frac{13}{15}$ | $\frac{13}{15}$

Problems Using Fractions

1. Helen sold 3 ducks weighing $3\frac{3}{4}$ lb., 4 lb., and $4\frac{5}{8}$ lb. What was the total weight of these ducks?

2. One turkey weighed $18\frac{1}{4}$ lb., and another weighed $16\frac{3}{4}$ lb. Find the difference in weight.

3. One Saturday Mary rode her bicycle $6\frac{7}{10}$ mi., and Ruth rode $7\frac{1}{2}$ mi. How much farther did Ruth ride?

4. A small sack of potatoes weighed $14\frac{3}{8}$ lb., and another weighed $15\frac{3}{4}$ lb. Find the weight of both.

5. Susan has a piece of toweling $2\frac{1}{4}$ yd. long. If she cuts off $1\frac{1}{8}$ yd., how much of the piece is left?

6. Martha has a sheet of paper which measures 11 in. by $8\frac{1}{2}$ in. What is the difference between the length and the width?

7. Three geese weighed $7\frac{7}{8}$ lb., $8\frac{3}{4}$ lb., and $9\frac{5}{16}$ lb. What was the combined weight?

8. Edith bought 3 remnants of cloth containing $\frac{7}{8}$ yd., $1\frac{2}{3}$ yd., and $2\frac{1}{4}$ yd. How many yards of cloth did she buy?

9. Harold weighs $70\frac{1}{2}$ lb., and Joe weighs $69\frac{3}{4}$ lb. How much heavier is Harold than Joe?

10. Jerry cut off $\frac{5}{6}$ ft. from a board $4\frac{1}{2}$ ft. long. How many feet long was the board then?

11. In 3 days Joyce gathered $3\frac{3}{4}$ doz., $4\frac{1}{2}$ doz., and $3\frac{2}{3}$ doz. eggs. How many dozen eggs did she gather?

12. Martha weighed $66\frac{3}{4}$ lb. in March and $68\frac{1}{4}$ lb. in June. How many pounds did she gain?

13. At the track meet Louis jumped $9\frac{3}{4}$ ft. and Jim jumped $10\frac{1}{3}$ ft. How much farther did Jim jump?

14. What is the difference in the length of 2 remnants of cloth, one $\frac{5}{6}$ yd. long and the other $\frac{8}{9}$ yd.?

Subtraction of Unlike Fractions

Subtract. To prove, add subtrahend and remainder.

1.	$\frac{3}{4}$	$\frac{5}{6}$	$\frac{7}{8}$	$\frac{1}{2}$	$\frac{9}{10}$	$\frac{3}{4}$	$\frac{11}{12}$	$\frac{5}{8}$
	$\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{5}{6}$	$\frac{1}{2}$
2.	$\frac{5}{6}$	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{7}{8}$	$\frac{3}{4}$	$\frac{8}{9}$	$\frac{13}{16}$	$\frac{3}{4}$
	$\frac{3}{4}$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{2}{3}$	$\frac{2}{5}$	$\frac{2}{3}$	$\frac{5}{8}$	$\frac{2}{3}$
3.	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{5}{8}$	$\frac{11}{12}$	$\frac{7}{24}$	$\frac{4}{9}$	$\frac{11}{12}$	$\frac{17}{20}$
	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{7}{8}$	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{3}{10}$
4.	2	4	6	7	8	9	5	
	$\frac{3}{5}$	$1\frac{1}{3}$	$5\frac{3}{4}$	$3\frac{1}{6}$	$4\frac{3}{10}$	$3\frac{5}{8}$	$2\frac{11}{12}$	
5.	$5\frac{3}{4}$	$6\frac{1}{2}$	$7\frac{2}{3}$	$8\frac{1}{6}$	$6\frac{7}{8}$	$7\frac{3}{10}$	$9\frac{5}{12}$	
	$2\frac{1}{2}$	$4\frac{3}{4}$	$3\frac{1}{6}$	$6\frac{2}{3}$	$\frac{1}{2}$	$5\frac{1}{5}$	$4\frac{5}{6}$	
6.	$4\frac{3}{4}$	$8\frac{2}{3}$	$6\frac{1}{4}$	$7\frac{2}{3}$	$9\frac{1}{8}$	$6\frac{1}{6}$	$5\frac{1}{4}$	
	$2\frac{2}{3}$	$1\frac{3}{4}$	$5\frac{3}{5}$	$4\frac{3}{8}$	$8\frac{2}{3}$	$4\frac{3}{8}$	$3\frac{7}{10}$	
7.	$8\frac{11}{12}$	$3\frac{2}{5}$	$6\frac{1}{8}$	$7\frac{1}{2}$	$5\frac{3}{10}$	$6\frac{1}{12}$	$2\frac{2}{9}$	
	$2\frac{2}{3}$	$1\frac{2}{3}$	$2\frac{5}{12}$	$3\frac{11}{12}$	$4\frac{3}{5}$	$2\frac{3}{4}$	$1\frac{5}{6}$	
8.	$7\frac{11}{16}$	$9\frac{1}{4}$	$4\frac{15}{16}$	$5\frac{3}{8}$	$12\frac{1}{2}$	$5\frac{1}{6}$	$8\frac{17}{24}$	
	$6\frac{1}{2}$	$4\frac{3}{16}$	$3\frac{7}{8}$	$1\frac{11}{16}$	$9\frac{13}{16}$	$3\frac{1}{4}$	$7\frac{7}{12}$	
9.	$8\frac{3}{4}$	$6\frac{2}{3}$	$5\frac{1}{3}$	$7\frac{3}{8}$	$4\frac{13}{16}$	$6\frac{9}{10}$	$9\frac{5}{16}$	
	$3\frac{9}{10}$	$5\frac{7}{8}$	$2\frac{3}{4}$	$4\frac{7}{12}$	$3\frac{3}{4}$	$6\frac{2}{5}$	$2\frac{5}{8}$	
10.	$4\frac{5}{12}$	$7\frac{11}{24}$	$6\frac{5}{6}$	$8\frac{3}{20}$	$4\frac{3}{4}$	$9\frac{11}{20}$	$5\frac{3}{8}$	
	$\frac{7}{24}$	$\frac{1}{3}$	$4\frac{11}{24}$	$5\frac{3}{10}$	$2\frac{7}{20}$	$3\frac{3}{5}$	$3\frac{7}{24}$	

Practice with Measures

Copy, and write the numbers missing below:

1.	4 qt. 2 pt. = __ pt.		15 pt. = __ qt. __ pt.
2.	5 gal. 1 qt. = __ qt.		19 qt. = __ gal. __ qt.
3.	7 bu. 3 pk. = __ pk.		25 pk. = __ bu. __ pk.
4.	6 pk. 7 qt. = __ qt.		43 qt. = __ pk. __ qt.
5.	3 lb. 9 oz. = __ oz.		37 oz. = __ lb. __ oz.
6.	4 yr. 7 mo. = __ mo.		21 mo. = __ yr. __ mo.
7.	5 ft. 9 in. = __ in.		59 in. = __ ft. __ in.
8.	7 yd. 2 ft. = __ ft.		31 ft. = __ yd. __ ft.
9.	3 wk. 5 da. = __ da.		24 da. = __ wk. __ da.
10.	3 da. 7 hr. = __ hr.		75 hr. = __ da. __ hr.
11.	10 oz. = __ lb.	9 in. = __ ft.	2 ft. = __ yd.
12.	24 in. = __ yd.	80 rd. = __ mi.	3 pk. = __ bu.
13.	6 qt. = __ pk.	500 lb. = __ T.	20 sec. = __ min.
14.	12 min. = __ hr.	8 hr. = __ da.	11 mo. = __ yr.
15.	7 units = __ doz.	2 qt. = __ gal.	1 pt. = __ qt.
16.	2 da. 6 hr. = __ da.		1 yr. 3 mo. = __ yr.
17.	4 ft. 8 in. = __ ft.		2 hr. 45 min. = __ hr.
18.	8 yd. 2 ft. = __ yd.		3 mi. 40 rd. = __ mi.
19.	2 lb. 14 oz. = __ lb.		5 bu. 1 pk. = __ bu.
20.	3 pk. 6 qt. = __ pk.		2 wk. 5 da. = __ wk.
21.	2 min. 24 sec. = __ min.		2 yd. 9 in. = __ yd.
22.	17 in. = __ ft.	24 oz. = __ lb.	10 ft. = __ yd.
23.	16 mo. = __ yr.	9 qt. = __ gal.	15 pt. = __ qt.
24.	90 min. = __ hr.	36 hr. = __ da.	18 pk. = __ bu.
25.	54 in. = __ yd.	80 sec. = __ min.	2500 lb. = __ T.

Using Multiplication of Fractions

Change the following to inches:

1.	1 ft.	$\frac{1}{2}$ ft.	$\frac{1}{3}$ ft.	$\frac{2}{3}$ ft.	$\frac{1}{4}$ ft.	$\frac{3}{4}$ ft.
2.	$\frac{1}{6}$ ft.	$\frac{5}{6}$ ft.	$\frac{1}{12}$ ft.	$\frac{5}{12}$ ft.	$\frac{7}{12}$ ft.	$\frac{11}{12}$ ft.
3.	$1\frac{1}{2}$ ft.	$2\frac{1}{3}$ ft.	$2\frac{1}{4}$ ft.	$1\frac{2}{3}$ ft.	$3\frac{3}{4}$ ft.	$1\frac{1}{6}$ ft.
4.	$2\frac{5}{12}$ ft.	$\frac{1}{8}$ ft.	$1\frac{3}{8}$ ft.	$1\frac{1}{8}$ ft.	$\frac{1}{5}$ ft.	$\frac{2}{5}$ ft.
5.	1 yd.	$\frac{1}{2}$ yd.	$\frac{1}{3}$ yd.	$\frac{2}{3}$ yd.	$\frac{1}{4}$ yd.	$\frac{3}{4}$ yd.
6.	$\frac{1}{6}$ yd.	$\frac{5}{6}$ yd.	$\frac{1}{9}$ yd.	$\frac{2}{9}$ yd.	$\frac{4}{9}$ yd.	$\frac{5}{9}$ yd.
7.	$\frac{7}{9}$ yd.	$\frac{8}{9}$ yd.	$\frac{1}{8}$ yd.	$\frac{1}{12}$ yd.	$\frac{1}{18}$ yd.	$\frac{1}{5}$ yd.
8.	$\frac{5}{12}$ yd.	$\frac{7}{12}$ yd.	$\frac{11}{12}$ yd.	$\frac{1}{36}$ yd.	$\frac{3}{8}$ yd.	$2\frac{1}{2}$ yd.
9.	$3\frac{1}{4}$ yd.	$2\frac{1}{3}$ yd.	$1\frac{3}{4}$ yd.	$3\frac{2}{3}$ yd.	$1\frac{1}{8}$ yd.	$2\frac{1}{9}$ yd.

Change the following to ounces:

10.	$\frac{1}{2}$ lb.	$\frac{1}{4}$ lb.	$\frac{3}{4}$ lb.	$\frac{1}{8}$ lb.	$\frac{3}{8}$ lb.	$\frac{5}{8}$ lb.
11.	$\frac{7}{8}$ lb.	$\frac{1}{16}$ lb.	$\frac{3}{16}$ lb.	$\frac{5}{16}$ lb.	$\frac{7}{16}$ lb.	$\frac{9}{16}$ lb.
12.	$2\frac{1}{2}$ lb.	$3\frac{1}{4}$ lb.	$1\frac{3}{8}$ lb.	$\frac{1}{3}$ lb.	$\frac{1}{6}$ lb.	$\frac{1}{5}$ lb.

Find the answers to the following:

13.	$\frac{7}{8}$ of 24	$\frac{2}{3}$ of 21	$\frac{5}{6}$ of 54	$\frac{7}{10}$ of 50	$\frac{8}{9}$ of 63
14.	$\frac{3}{4}\times 60$	$\frac{4}{5}\times 45$	$\frac{5}{8}\times 48$	$\frac{2}{3}\times 75$	$\frac{5}{6}\times 72$
15.	$\frac{6}{7}$ of 35	$\frac{4}{9}$ of 36	$\frac{7}{12}$ of 36	$\frac{3}{16}$ of 75	$\frac{3}{4}$ of 84
16.	$\frac{1}{2}\times 7$	$\frac{1}{3}\times 8$	$\frac{1}{4}\times 9$	$\frac{1}{5}\times 11$	$\frac{1}{6}\times 8$
17.	$\frac{1}{8}$ of 17	$\frac{1}{4}$ of 11	$\frac{1}{3}$ of 26	$\frac{1}{2}$ of 13	$\frac{1}{9}$ of 12
18.	$8\times\frac{1}{3}$	$7\times\frac{3}{4}$	$9\times\frac{5}{6}$	$6\times\frac{2}{3}$	$5\times\frac{3}{8}$
19.	$3\times 4\frac{3}{4}$	$8\times 2\frac{1}{2}$	$6\times 6\frac{2}{3}$	$9\times 8\frac{2}{3}$	$5\times 3\frac{1}{2}$
20.	$8\times 5\frac{5}{8}$	$7\times 1\frac{3}{4}$	$5\times 4\frac{1}{3}$	$3\times 4\frac{3}{5}$	$6\times 2\frac{3}{4}$
21.	$1\frac{1}{3}\times 11$	$2\frac{1}{2}\times 7$	$2\frac{2}{3}\times 12$	$4\frac{3}{4}\times 16$	$1\frac{2}{5}\times 20$
22.	$4\frac{3}{8}\times 9$	$5\frac{1}{2}\times 3$	$3\frac{4}{5}\times 15$	$1\frac{5}{6}\times 12$	$1\frac{7}{8}\times 24$

Problems Using Fractions

1. When grapefruit sell at 3 for 10¢, what would you pay for one grapefruit?

2. At 48¢ a pound, what is the cost of $1\frac{3}{4}$ lb. of steak?

3. When 4 bars of laundry soap sell for 17¢, what would you pay for one bar of soap?

4. How many square feet are there in the area of a floor $18\frac{3}{4}$ ft. long and 12 ft. wide?

5. When potatoes sell at $3\frac{1}{3}$¢ a pound, what is the cost of 45 pounds of potatoes?

6. At 37¢ a pound, what would you pay for $3\frac{1}{2}$ pounds of mutton?

7. At $87\frac{1}{2}$¢ an hour, how much does a man earn in 38 hours?

8. Find the total weight of 3 hams weighing $12\frac{3}{4}$ lb., $14\frac{5}{8}$ lb., and $15\frac{1}{4}$ lb.

9. At an average speed of 43 miles per hour, how far will an automobile travel in $4\frac{1}{2}$ hours?

10. When 6 cans of tomatoes sell for 75¢, what will 2 dozen cans cost?

11. At 30¢ a dozen, what would you have to pay for 3 lemons? for 1 lemon?

12. When a train runs 184 miles in 5 hours, what is the average speed?

13. When oranges sell at 3 for 10¢, how many oranges can you get for 50¢?

14. At 48¢ a yard, what is the cost of material for 6 sheets, each made of $2\frac{1}{2}$ yd. of wide sheeting?

Problem Practice

1. Find the cost of 10 lb. of sugar at $5\frac{1}{2}¢$ a pound and $2\frac{1}{2}$ doz. eggs at 42¢ a dozen.

2. How many cubic inches of seed can a box hold which is 12 in. long, 6 in. wide, and $4\frac{1}{2}$ in. deep?

3. At $2.65 per square yard, what will it cost to lay a cement walk 3 ft. wide and 24 yd. long?

4. At 35¢ per square foot, what will it cost to lay a cement floor 6 yd. long and 4 yd. wide?

5. If you buy $3\frac{1}{4}$ lb. of pork at 36¢ a pound, what is your change from $5?

6. How many acres are there in a field 45 rods long and 20 rods wide?

7. Ruth lives $\frac{3}{4}$ of a mile from school. How far does she walk in 5 days going to and from school?

8. A park is 75 rods long and 60 rods wide. What fraction of a mile is the distance around the park?

9. Six boys weighed 76 lb., 81 lb., 67 lb., 84 lb., 72 lb., and 88 lb. Find the average weight.

10. A dealer bought 30 gallons of milk at 37¢ a gallon and sold it for 12¢ a quart. Find his gain.

11. Mr. Gordon bought 2 loads of coal weighing 4200 lb. and 4800 lb. How many tons of coal did he buy?

12. Mr. King bought $9\frac{1}{2}$ tons of coal at $7.60 per ton and $5\frac{3}{4}$ tons at $8.20 per ton. Find the cost.

13. At 95¢ an hour, what are the total earnings of 2078 mine workers for an 8-hour day?

14. An agent paid $5600 for a house. He spent $465.75 for painting and repairs and sold it for $6750. How much did he make?

Sight Problems

1. At 2 dozen for 55¢, what do 4 dozen oranges cost? What would you have to pay for 1 dozen?

2. Ruth is $56\frac{1}{2}$ in. tall, and her older sister is 63 in. tall. What is the difference in their heights?

3. Mary bought $1\frac{7}{8}$ pounds of steak at 40¢ a pound. What was her change from 1 dollar?

4. When candy sells at 40¢ a pound, what part of a pound would you get for 25¢?

5. Find the weight in ounces of two packages, one weighing $\frac{1}{2}$ lb. and the other $\frac{1}{4}$ lb.

6. At $1.50 a yard, $\frac{2}{3}$ yd. of cloth will cost how much more than $\frac{1}{2}$ yd.?

7. Walter worked $4\frac{3}{4}$ hr. at 20¢ an hour and spent 75¢ for a knife. How much money did he have left?

8. Find the distance in feet between two telephone poles set 8 rods apart.

9. A schoolroom floor 34 ft. long and 30 ft. wide contains how many square feet?

10. Harold is 4 ft. 6 in. tall, and Jerry is 50 in. tall. How many inches taller is Harold than Jerry?

11. At an average speed of 50 miles per hour, how far will an auto travel from 8:30 A.M. to 11 A.M.?

12. Virginia had $4\frac{1}{2}$ yd. of gingham and used $2\frac{1}{8}$ yd. for an apron. How much cloth did she have left?

13. If each of 40 persons is served with $\frac{1}{2}$ pint of ice cream, how many quarts of ice cream will be needed?

14. Mary bought a 40¢ pair of anklets and a 20¢ handkerchief on sale at $\frac{1}{4}$ off. Find the sale prices.

Fractions in Cooking

Violet found, in helping her mother make a cake, that it is often necessary to double the amount given in recipes. Sometimes still different quantities must be used, as is seen in the following problems:

1. How much of these items would you use in a recipe for ice-box cake if you multiplied the quantities by 3?

1 tablespoon gelatin	$2\frac{1}{2}$ tablespoons sugar
$\frac{1}{4}$ cup cold water	$\frac{1}{2}$ pint cream
$\frac{2}{3}$ cup scalded milk	1 teaspoon vanilla

10 lady fingers

2. Violet's mother wanted to make popovers. What amount would she need of each of these items if she used three times the recipe?

$1\frac{1}{3}$ cups flour	$\frac{7}{8}$ cup milk
$3\frac{1}{2}$ teaspoons melted butter	2 eggs
$2\frac{1}{2}$ teaspoons baking powder	$\frac{1}{4}$ teaspoon salt

Problem Practice

1. Alfred mailed several books for his father and found that the charge was $1\frac{1}{2}$ cents a pound for each pound or fraction of a pound. What postage did he use for each of four books weighing 2 lb., 1 lb. 6 oz., 3 lb., and 3 lb. 9 oz.?

2. Arthur practiced $\frac{3}{4}$ of an hour on his violin each day last week. How many minutes did he practice from Monday through Saturday?

3. At a cost of $\frac{1}{3}$¢ per hour, how much will Mr. Jones have to pay to run his electric fan 6 hours a day during 60 days in the summer?

4. Mrs. Brown purchased 5 cans of corn at $12\frac{1}{2}$¢ per can and 7 cans of peas at $16\frac{2}{3}$¢ per can. Find the cost.

Problem Practice

1. How many quart bottles can be filled from a barrel of $31\frac{1}{2}$ gallons of vinegar?

2. At 76¢ per bushel, what is the value of a load of corn weighing 5076 lb.? (56 lb. corn = 1 bu.)

3. What is the perimeter of a rectangle that measures $14\frac{3}{4}$ ft. by $12\frac{1}{2}$ ft.?

4. At \$8.50 per ton, what is the cost of 5500 pounds of coal?

5. From a board 9 ft. 3 in. long, Harold cut off a piece 3 ft. 6 in. How long was the piece remaining?

6. Mary and her 3 friends shared equally the expenses of a party. They spent \$1.80 for ice cream and \$1.40 for cake. Find each girl's share of the expenses.

7. With his paper route Louis earned \$2.75 in March, \$3.20 in April, and \$4.58 in May. What was his average monthly earning?

8. Susan has 3 pieces of ribbon $1\frac{5}{6}$ yd., $2\frac{1}{3}$ yd., and $1\frac{3}{4}$ yd. long. How many yards of ribbon has she?

9. Helen bought $4\frac{1}{2}$ yd. of ribbon at 18¢ per yard and a pair of gloves for 45¢. Find her change from \$2.

10. From a board 38 in. long, Bob cut off 2 boards, each $17\frac{7}{8}$ in. long, to make a box cover. How long was the remaining piece?

11. Mr. Bond bought 10 gal. of gas at $18\frac{1}{2}$¢ and 2 qt. of oil at 27¢. What was his change from \$5?

12. Three men rented an auto for \$45 to make a 4-day trip. What did it cost each man per day?

13. In making a tent, Mrs. King used 42 yd. of duck cloth weighing $12\frac{1}{2}$ oz. per yard. How many pounds did this cloth weigh?

Tables of Measures

Liquid Measure

2 cups (c.) = 1 pint (pt.)
2 pt. = 1 quart (qt.)
4 qt. = 1 gallon (gal.)

Dry Measure

2 pt. = 1 quart
8 qt. = 1 peck (pk.)
4 pk. = 1 bushel (bu.)

Counting

12 = 1 dozen (doz.)
12 doz. = 1 gross (gro.)
20 = 1 score

Weight

16 oz. = 1 pound (lb.)
100 lb. = 1 hundredweight (cwt.)
2000 lb. = 1 ton (T.)

Long Measure

12 inches (in.) = 1 foot (ft.)
3 ft. = 1 yard (yd.)
$16\frac{1}{2}$ ft. / $5\frac{1}{2}$ yd. = 1 rod (rd.)
320 rd. / 5280 ft. = 1 mile (mi.)

Square Measure

144 sq. in. = 1 sq. ft.
9 sq. ft. = 1 sq. yd.
$30\frac{1}{4}$ sq. yd. = 1 sq. rd.
160 sq. rd. = 1 acre (A.)
640 acres = 1 sq. mi.
1 sq. mi. = 1 section

Cubic Measure

1728 cu. in. = 1 cu. ft.
27 cu. ft. = 1 cu. yd.

Time Measure

60 sec. = 1 minute (min.)
60 min. = 1 hour (hr.)
24 hr. = 1 day (da.)
7 da. = 1 week (wk.)
365 da. / 12 mo. = 1 year (yr.)
366 da. = 1 leap year
10 yr. = 1 decade
100 yr. = 1 century

U. S. Money

10 mills = 1 cent
5 cents = 1 nickel
10 cents = 1 dime
10 dimes / 100 cents = 1 dollar

Useful Equivalents

1 cu. ft. water = $62\frac{1}{2}$ lb.
1 gal. water = about $8\frac{1}{3}$ lb.
231 cu. in. = 1 gal.
1 cu. ft. = about $7\frac{1}{2}$ gal.
1 cu. ft. = $\frac{4}{5}$ bu.

1 bu. wheat = 60 lb.
1 bu. potatoes = 60 lb.
1 bu. rye = 56 lb.
1 bu. corn = 56 lb.
1 bu. barley = 48 lb.

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